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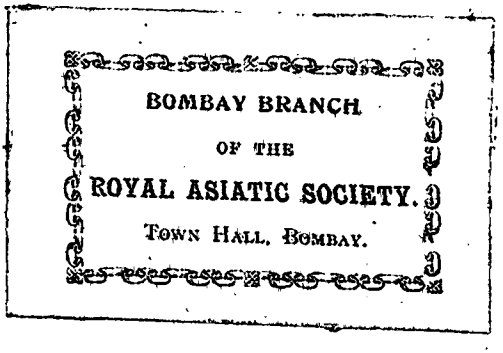

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JOURNAL

OF A VOYAGE TO THE

NORTHERN WHALE-FISHERY;

INCLUDING

RESEARCHES AND DISCOVERIES ON THE EASTERN COAST

OF

WEST GREENLAND,

MADE IN THE SUMMER OF 1822, IN THE SHIP

BAFFIN OF LIVERPOOL.

BY

WILLIAM SCORESBY *Junior*,

F. R. S. E., M. W. S. &c. &c.

COMMANDER.

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LIVERPOOL,
4th March 1823.

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INTRODUCTION.

THE original design of the voyage, an account of which forms the subject of the following pages, was the prosecution of the Whale-fishery on the coasts of Greenland and Spitzbergen. Discovery was an object, therefore, that could only be pursued subserviently to this ; but it fortunately proved compatible with the leading design we had in view. The choice of the situation in which the fishery should be attempted, being left entirely to myself, I preferred the Coast of Greenland to that of Spitzbergen. This was not only the most promising station for success, but likewise the most agreeable to my wishes, as affording a hope of making researches on a coast that was almost entirely unknown. The result was successful in both respects. An excellent cargo of whales for the season, the fishing being in the

main very indifferent, was obtained; and extent of coast, the principal part of w previously unknown, was investigated veyed.

The voyage was accomplished in the sh fin, burden 321 tons, built at Liverpool my personal inspection, expressly for the whale-fishery, in the year 1820. No expence having been spared in the construction of this ship, every known principle calculated for producing strength, accommodation, sea-worthiness, and fast sailing, in so far as these properties were compatible, was adopted, and with such good effect, as to answer, upon trial, our highest expectations.

As the fishery of Baffin's Bay, in consequence of the great loss of shipping that has been sustained on that station within the last four or five years, will probably be pursued to a less extent than formerly, the fishery of Greenland, in which there have been very few losses, will rise in importance.

It is therefore hoped, that the researches made during this voyage on the Coast of Greenland,

will prove of some consequence to our trade in this quarter, and that they will afford such geographical and hydrographical information, as may be the means of advancing the prosperity, and increasing the safety, of those engaged in this arduous business.

Hitherto the situation of the East Coast of Greenland was so erroneously laid down, that the charts of this country were a snare rather than a safeguard to the navigator. Thus, a ship taking her departure from the *West Land*, under the supposition that its longitude was correctly laid down, would make an error of perhaps twelve or fourteen degrees, which, in the event of storms and foggy weather, might be productive of fatal consequences. A much less error than this, indeed, would take a ship into the middle of the Northern Coast of Iceland, when the navigator imagined himself to be in the fair way betwixt Iceland and Faroe. Owing to this cause, it probably was, that a whaler, in the year 1821, ran on shore on the north of Iceland; though, in this instance, being fortunately moderate weather, the ship was got afloat again.

To the arctic navigator, therefore, the researches detailed in this volume may be useful, and possibly important. But there is another view in which these researches, as far as they have a bearing on the subject, obtain a higher public interest. This is, the reference they in some degree have to the ancient Colonies of Norwegians, planted on a coast continuous with that investigated on this voyage.

Though the general history of these colonies is well known, a sketch of the leading facts relating to them, with the various attempts that have been made for their recovery, appears to me to be called for here, as an introduction to the Journal occupying the following sheets.

As far as the colonies planted on the coast of Greenland have a reference to Iceland, it may be proper to premise, that this island was the accidental discovery of a Scandinavian depredator of the name of Naddodd, who was driven upon its coast by a storm, about the year 861,—that it was visited soon afterwards by different adventurers of Sweden and Norway, and first colonized by Ingolf and Lief, two Norwegians, with

a company of their adherents, about the year 878. These persons, who were induced to emigrate to Iceland from political oppression, were joined, in the course of a few years, by a number of Norwegian families, who resorted thither from a similar cause; so that they soon constituted a considerable colony.

About the middle, or towards the end of the tenth century, an extensive country to the westward of Iceland, was discovered by one of the colonists, of the name of Gunbiorn. This new coast was visited, in the year 982, by one Eric Rauda, a Norwegian, who had been banished his country for various crimes of which he had been guilty. Eric wintered on the southern part of the coast, near an inlet, which he named Eric's Sound; and, after spending part of three years in exploring it, he returned to Iceland. For the purpose of encouraging persons to become settlers in this country, he denominated it Greenland, and gave a most exaggerated account of its products and appearance. In consequence of his representations, a fleet of twenty-five sail was shortly afterwards equipped, which, laden with people

of both sexes, and the requisite stores and cattle for forming a settlement, put off for Greenland; but only fourteen of the fleet arrived safe at their destination. The people in this part of the fleet, however, planted themselves on the new coast, and being soon joined by others, both from Iceland and Norway, they, in a few years, became a respectable colony.

Christianity was introduced into Norway towards the end of the tenth century, by Bernard and Guthebald, it is said, two British Missionaries, and was embraced, and zealously promoted by the King, Olaus Tryggeson. Leif, the son of Eric Rauda, having made a voyage to Norway in the year 999, gave Olaus an account of the new colony in Greenland. On which the king, in his zeal for the extension of the true faith, prevailed upon Leif to be baptized, and to take out with him a Christian missionary, on his return to Greenland. By their means Paganism began to be relinquished, and the milder dispensation of the Gospel was soon introduced, and generally received both in Greenland and Iceland.

At this time the Greenland colonies seem to have been in a very flourishing state. They became a bishoprick in the year 1121, when, according to Torfæus, Arnold, the first regularly installed Bishop, was delegated to the office by Sigurd, king of Norway.

The colonies are stated by Crantz, and others, to have extended from Cape Farewell, the southern point of Greenland, five or six degrees of latitude towards the north, both on the east and west side of the country. About sixteen churches are mentioned as having been built on these coasts. Crantz informs us, that there were nineteen bays or inlets, that were inhabited on the east side. On these were planted a hundred and ninety farms or hamlets, constituting twelve parishes, with the Bishop's see, and two convents. And, on the west side, it appears that there were nine cultivated inlets, on which ninety, or, as some say, one hundred and ten hamlets were built, that constituted four parishes.

This information, which I have taken principally from Crantz's interesting and excellent "His-

" tory of Greenland," is, in the main, derived from an Iceland Chronicle by Snorro Sturleson, who was Justiciary of this island about the year 1215. This chronicle was the principal source on which Thormoder Torfæus, a native of Iceland, founded his *Grœnlandia Antiqua*, a work which Crantz intimates he principally followed.

In consequence of the total want of success in all the researches that have been made for the recovery of the eastern colonies, some persons imagine that the site of the colonies was only on the western side of Cape Farewell. For supporting this opinion, a treatise on the real situation of Osterbygd, in Greenland, by M. Peter von Eggers, recently appeared in Denmark. But there is one unfortunate fact mentioned by the author, respecting the course and time of sailing from Iceland to the colonies, the truth of which he does not question, that appears to me to overthrow the whole of the ingenious reasoning brought forward in the treatise. One author, Eggers observes, recommends navigators to steer south-west from Iceland, instead of the usual direct course, to avoid the ice, and then north-

west to Greenland. These courses, it is clear, must bring the navigator to the eastern coast, if he reached the coast at all, whatever be the distances sailed. And other authors, both Icelandic and Danish, represent the time required for reaching the colonies as such, when compared with the length given to the voyage from Norway to Iceland, that, to accomplish the distance round Cape Farewell, Eggers is obliged to take into account the currents running towards the south-west; but these, it should seem, if calculated at their known rate, will by no means make up the required distance.

Hence, I conceive, that there is yet no sufficient ground for rejecting the opinion of Torfæus, Crantz, and various other authors, as to the distribution of the colonies on both sides of Cape Farewell,—as well on the eastern as on the western coast.

From a list of the Bishops of Greenland, as given by Torfæus and Holberg, it appears that seventeen were sent out to the colonies in regular succession, the last of whom, Andrew, embarked

for this station in the year 1408. His predecessor Henry, however, was the last Bishop who was known to reach his see, for Andrew is said to have been prevented from landing by the ice.

The scanty annals of the Greenland colonies here come to a close, after which period, 1406 or 1408, the trade with Iceland and Norway, that had previously been considerable, was discontinued, and, it would appear, no intercourse between Iceland and Greenland was ever after accomplished.

Various are the speculations on this strange suspension of intercourse. Some attribute it to the extermination of the colonists, either by the Skrællings (or wild Greenlanders), or by a remarkable pestilence called the *black death*, which raged about the middle of the fourteenth century, and spread all over Europe. Others account for it by the sudden setting down of the polar ice, which, inclosing the eastern coast and Cape Farewell, as it generally does at the present day, cut off all communication with the parent countries, deprived the colonists of their

usual supplies, and became the means of their extinction.

Which of these causes may have occasioned the loss of the colonies to Iceland and Norway, or the suspension of the intercourse, is a question of comparatively little moment; but the determination of the fact of their total extinction, or their present existence, is an inquiry of a high degree of interest and importance.

If they still exist, What are their present state and situation,—their mental and moral condition? They were a civilized and perhaps intelligent people: To what extent has intercourse and admixture with the native Esquimaux, barbarized their manners, and reduced their mental faculties? They were a Christian people: To what extent has the force of example and incorporation with a heathen nation, been productive of demoralization, and the loss of the benign influences of Christianity?

These are questions, which, to humanity in general, and to Christian philanthropy in parti-

cular, are of deep and intense interest. But, while I regret that the researches detailed in the succeeding pages do not afford decisive answers to these inquiries, I have the satisfaction of believing that they have some bearing upon the question of the present existence of the ancient colonies. As such, I am anxious that they may be the means of calling the public attention more strongly to the fate of this interesting people, with the hope that those in office, who have the power of ordering the needful investigations, may be induced to pursue the requisite steps for obtaining information concerning them. And this I would urge, not simply as an object of curiosity, but with a view of restoring them to the privileges and advantages of that Christian intercourse and fellowship, of which they have been so long deprived.

That these colonists were exterminated at the time of their separation from the rest of the world, may be shewn to be extremely improbable, from a variety of considerations.

In respect to their destruction by the "black

death," I do not find that there is any certain account of this plague having ever reached the country. Crantz only negatively argues, that, as this contagion prevailed most in the northern parts of Europe, " it may be well supposed, that Greenland, too, must have been infected, through its frequent commercial intercourse with Norway." And, in regard to their destruction by the Skrællings, the proofs are equally negative and inconclusive. These people made their appearance on the west side among the colonists, in the time of Alpho, the 11th Bishop of Greenland, probably about the year 1350. " They are reported to have killed eighteen of the Norwegians, and to have carried away two boys prisoners;" but " the ancients record no other circumstances of war." As the Skrællings are represented as a very cowardly race, whereas the colonists were known to be a brave people,—" How then," inquires the judicious Crantz, " should they be capable of over-matching the valiant Norwegians, these sons of conquerors, in their well peopled colonies, and barricadoed by craggy rocks; and of extirpating them so totally, that we have not hitherto been able to trace any footsteps of them?"

I do not affirm this, he adds, " but regard it as a groundless notion."

Hence, the only remaining reason usually given for their extinction, is the interception of their supplies by the setting down of the polar ice. Admitting the truth of the sudden imprisonment of the colonists, by the spreading of an icy zone along their coasts, the question of their destruction from this cause is purely conjectural. It goes on the supposition that they could not exist in this severe region, without assistance from the parent country, which is any thing but proof, since the Esquimaux are known to exist, if not thrive, on their own resources only, on the very same coast.

It is not only evident, however, that the proofs of the depopulation of the colonies, at the time of their separation from the rest of the world, are decidedly defective and negative; but, on the contrary, as Crantz declares, " it is certain some traces of them were perceived long after this." Thus, about the year 1530, Bishop Amund of Skalholt in Iceland, is said to have been driven

by a storm, on his return from Norway, so near the coast of Greenland, by Herjolf's Noss, that he could see the people driving their cattle. But he did not land, because just then a good wind arose, which carried the ship the same night to Iceland. The Icelander Biorn von Skardsa, whom Crantz here quotes, gives other evidence on this subject. He relates, that Tom Grœnlander, a Hamburgh sailor, was driven three times upon the coast of Greenland, where he saw fishers' huts, similar to what they have in Iceland. And he further mentions, that an oar, marked with a sentence in Runic characters,—pieces of the wreck of boats,—and, in the year 1625, an entire boat, fastened together with sinews and wooden pegs, were from time to time driven on shore at Iceland.

The modern accounts of the state of the east coast of Greenland entirely rest on oral testimony. One relation of this kind was communicated personally, it appears, to the missionary Crantz, by a party of Greenlanders, from the east coast, who visited some of their relations at Newherrnhuth, in the summer of 1752.

One of the party, of the name of Kojake, who lived sixty leagues up the east side of the country, informed the missionaries, that, in the preceding winter, he had lodged two men, who said they had made a three years excursion along the eastern coast in a women's-boat. They passed the first winter by the way,—in the second year they proceeded to the northward as far as the ice would permit,—and in the third they returned home. They proceeded to so high a latitude, that the sun, at mid-night, illuminated the tops of the mountains with its rays. In some places the ice was close in-shore, so that they had to place their tent and boat upon a sledge, and draw it across the ice by dogs. They described the people on the east side as taller than those on the west, and that they had black hair and large beards. The inhabitants were numerous, and the animals, on which they subsisted, plentiful. They saw a fine inlet, but did not enter it, for fear of the cannibals, which are said to live in that place, and of which all Greenlanders have a dread from former times. In the opinion of Kojake they became cannibals at first out of necessity, because once, in a great famine in winter, they had nothing

but human flesh to eat; and, as they relished it, they had now inured themselves to this strange and unnatural food. "They do not like to slaughter middle aged people, even in a time of dearth, but only old people and forsaken orphans; and they will preferably spare their dogs at such a time, because of their usefulness, and slay some unnecessary person in their stead." He also added, among several other curious particulars related by Crantz (vol. i. p. 267.), that they build their houses of stone, like the Greenlanders, and lay wooden rafters on the walls. But wood is there very scarce, and iron very rare, so that there is great joy, if they happen to find a nail in the wood that the sea drives upon their shores.

Another account, communicated to one of the factors in the modern western settlements, was to this effect. A Southlander, who wintered at the colony in the year 1757, stated, that there were people who lived in a certain inlet, on the east side of the country, who came down every spring in pretty large numbers to the sea coast. The Greenlanders fly from these men in their boats to the islands, who cannot follow them for

want of boats; but being of a cruel disposition, they shoot after them with arrows, which they carry in a quiver upon their backs.

"If this report could be depended on," Crantz observes, "we might suppose that these men, and the above mentioned cannibals, were both one people, who, descended from the old Norwegians, had sheltered themselves from the savages in the mountains, lived in enmity with them, out of resentment for the destruction of their ancestors, pillaged them in the spring, when sustenance failed them, and were looked upon by the savages as men-eaters, and fabulously represented through an excess of fear."

It is rather curious, that some collateral circumstances are considerably in favour of the truth of what these Esquimaux reported. Crantz mentions a rumour that reached Norway, about the year 1718, of a vessel belonging to Bergen having been wrecked in the ice on the coast of Greenland, and of the crew, who retreated to the land, having been "murdered, and voraciously eaten by the savages." Which frightful tale, he adds, "was

not altogether groundless." And Sir Charles Giesècké informs me, that the Esquimaux on the western side of Greenland retain, even at the present day, a great fear of the inhabitants of the eastern coast, whom they describe as barbarians, and are apprehensive, lest, at any time, they should come over and kill them. With reference to the arrows said to be used by these people, it may also be mentioned, that a piece of an instrument, perhaps of this kind, formed of bone and iron, resembling the head of a small dart or arrow, was found by one of my sailors, on a part of the coast we visited, which instrument, it appeared to me, was totally unlike those generally used by the native Esquimaux.

To these statements, intimating the present existence of the descendants of the ancient colonists, others of a less decisive kind, from Crantz, and some which resulted from my personal researches, might be added; but the former may be seen in the "History of Greenland," (vol. i. book iv. ch. i.) and the latter in the succeeding Journal. One fact, however, which has been

omitted in the Journal, may be added. Among the numerous relics of inhabitants which we met with on the east coast of Greenland, was an apparatus that was found by my father, resembling the fox-trap used by the Russian hunters, who occasionally winter on the coasts of Spitzbergen. This trap was formed principally of wood. It was thought to be a relic of the colonists, who having originally come from Norway, were likely to be acquainted with the contrivances used in a country nearly adjoining their own, for catching foxes, and other small animals. On the whole, I hope, therefore, that enough has been said to prove, that the total depopulation of the colonies is by no means certain; but, on the contrary, it is more than probable, that some remains of these people still exist.

It is no proof of the natives of this coast being purely Esquimaux, that the huts which I discovered were all of the description used by these people, because, on the suspension of the supplies formerly afforded the colonists from Iceland and Norway, they would consequently conform, from necessity, to the manners of the Esquimaux, as

being the most suitable possible to the nature of the climate, and the resources and circumstances of the inhabitants.

For the credit of the civilized world, it ought to be mentioned, that the ancient Greenland colonies have not been wholly forgotten, nor totally neglected. Denmark has made several attempts for the recovery of them; but it is an extraordinary fact, that none of her expeditions to the eastern side of Greenland (one perhaps excepted) have ever reached the coast.

About the middle of the sixteenth century, the first expeditions, of which we have any account, were dispatched from Denmark, in search of the ancient colonies in Greenland. Among these, Magnus Heinson, who passed for a renowned seaman in his day, was sent out by Frederick II., King of Denmark, in the year 1578. After encountering many difficulties and dangers from storms and ice, he obtained sight of the east coast of Greenland; but, after proceeding some time towards it, without appearing to get any nearer, though circumstances were very favourable for

his approach, he became alarmed, tacked about, and returned to Denmark. On his arrival, he attributed this extraordinary circumstance, magnified no doubt, by his fears, to his vessel having been stopped in its course by "loadstone rocks hidden in the sea." The true cause, however, of Heinson's not appearing to near the land when sailing with a fair wind towards it, was owing, I apprehend, to the deceptive character of the land, as to distance, some examples of which are noticed in the ensuing pages.

About the same period, Martin Frobisher made three voyages towards the north-west, under the auspices of Queen Elizabeth. He discovered Meta Incognita,—a strait called by his name,—and several other unimportant places: but the accounts of his voyages are so vague, that it is not satisfactorily made out whether these lands and inlets were on the coast of Greenland, or on that of Labrador. The search after gold-ore, of which some is said to have been found on the first voyage, seems to have been a leading object in the last two voyages of Frobisher.

In the year 1605, Christian IV. of Denmark sent out an expedition of three ships, towards Greenland, under the direction of Gotske Lindenau, as admiral, and James Hall, an Englishman, as pilot. Hall landed on the west side of Greenland, and, according to Crantz, seized four of the natives, who being wild and untractable, he was "obliged to kill one of them, to strike a terror into the rest." Lindenau, meanwhile, approached the east coast, or rather, as Mr Barrow suggests, the coast about Cape Farewell, where, it is said, he traded with the natives, though he did not land; and, at his departure, seized two of them, and took them away with him. "There was no resemblance between these men and those taken by Hall, neither in their language, dress, nor manners."

The next year Lindenau and Hall were employed a second time in the same service; but they only appear to have visited the western coast of Greenland, where nothing of consequence was discovered. Hall, in a third voyage, with two ships, undertaken in 1607, returned, after ha-

ving got the length of Cape Farewell, the crew having mutinied.

After this, Captain Carsten Richardson, with two ships, was dispatched on a similar service, by the King of Denmark, but he could not get near the land for ice.

In 1652, another expedition, of two ships, was sent out from Denmark, under Captain Dannell. The east coast, at intervals, was seen from latitude 65° 30′, to Cape Farewell, but no landing was effected. And the year following, a second examination of the coast was undertaken by the same navigator. The east coast was again seen, but only at a distance, from Herjolf's Noss to Cape Farewell.

The recovery of the colonies seems now to have been lost sight of by the Danes for a number of years, until the subject was revived by Hans Egedé, a clergyman belonging to the congregation at Vogen, in the northern part of Norway. Egedé had read of the Christian inhabitants who

had formerly had colonies in Greenland. He felt an interest in their fate, and made inquiries of a friend who had been much in the whale-fishery, respecting the present state of the country; and supposing, from the information he received, that the poor colonists were still in existence, and, he feared, through the want of teachers, had reverted into a state of heathenism, he thought it "the duty of every Norwegian, to search out his forlorn countrymen, and to carry the Gospel to them." He himself at length determined on undertaking the work; and after trying various means, for ten years, to bring his plans to bear, eventually obtained the needful supplies, and an appointment to the laborious and perilous office of missionary to the Greenlanders.

He embarked on this arduous business on the 22d of May 1721, and landed, after many dangers, near Ball's River, on the western coast of Greenland, on the 3d of July following. Here he fixed himself, and a few persons that accompanied him, and thus formed a little colony in this severe region. The difficulties and priva-

tions he suffered, could not have been sustained, excepting by a person like Egedé, who was zealously devoted to the duty to which he believed himself, in the dispensation of Providence, to be called.

In 1733, three Moravian missionaries proceeded to the colony, to whom Egedé, three years afterwards, relinquished the arduous office that he had sustained so long, almost alone, and returned to Denmark, with part of his family. This colony, which subsequently increased to a number of stations, has been continued, partly by the Danish government, and partly by the aid of trading companies, down to the present day; and the hardy and indefatigable Moravians, among whom was the celebrated Crantz, have continued to labour among the Esquimaux with undiminished zeal.

Egedé, and other missionaries, have made attempts, at different times, for the recovery of the lost colonies; but although ruins of churches, and other buildings, were discovered on the west side

of Cape Farewell, nothing to the eastward of the Cape was accomplished. One of the ruins met with by Egedé, between the 60th and 61st degree of latitude, was that of a church fifty feet long, and twenty broad, in the clear, and the walls six feet thick.

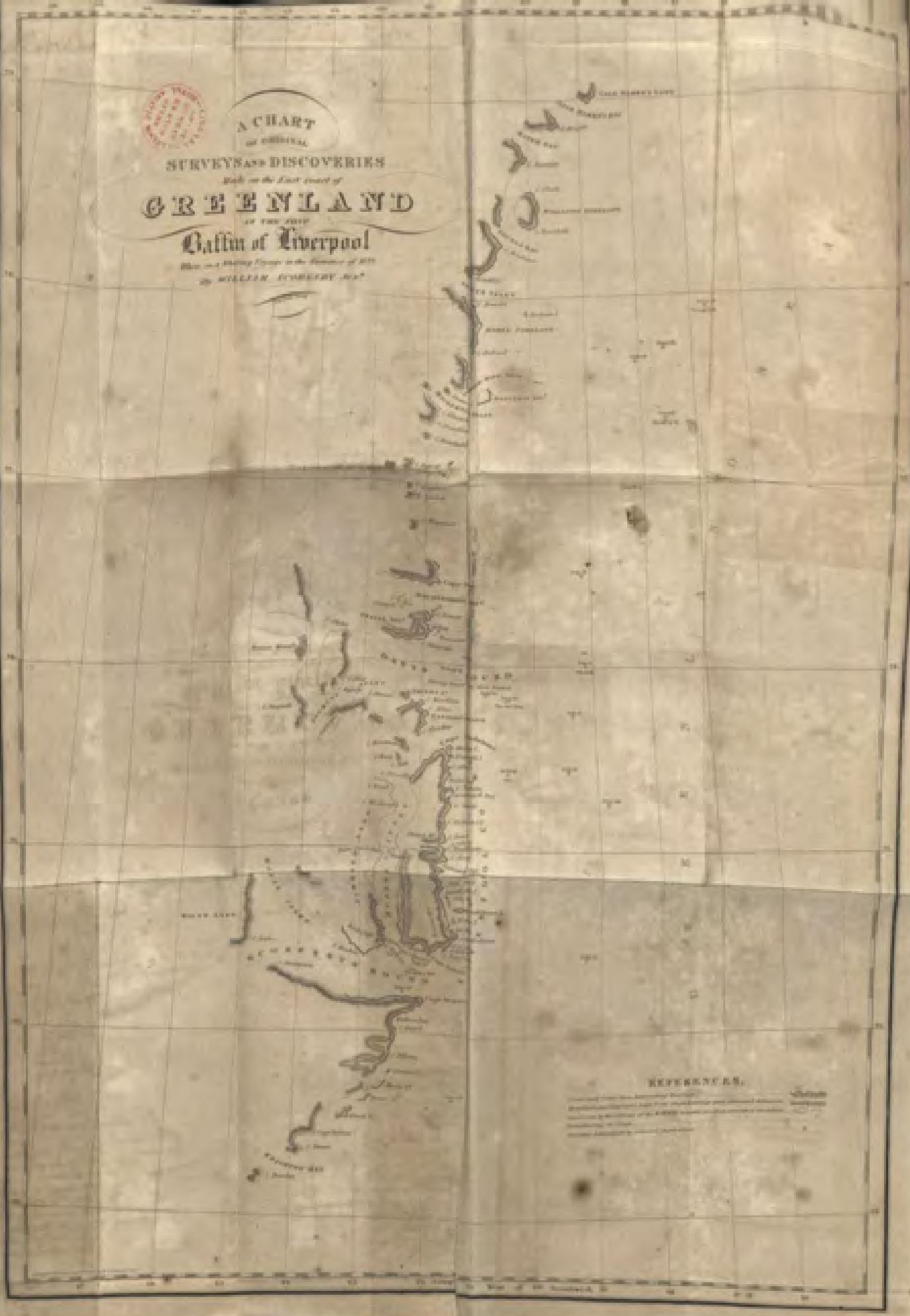
Besides the examinations respecting the lost colonies by the missionaries, the Greenland trading companies of Denmark and Norway have made several unsuccessful attempts to accomplish the same object.

Another expedition for the recovery of lost Greenland remains only to be mentioned. Captain Lowenorn and Lieutenant Egedé were sent out from Copenhagen on this design, in the year 1786. They made several trials to reach the coast, about the parallel of 65°, without being able to approach nearer than about fifty miles, on account of ice. Lowenorn returned to Denmark the same summer, and Egedé to Iceland to refit. The latter then made another attempt, in the month of August, when he reached within ten miles of the land, and then proceeded to Ice-

land, where he wintered. The next year, Egedé, with two small vessels, one of them commanded by Lieutenant Rothé, made other trials to approach the coast of Greenland, but with less success than before, never being able to reach the land within thirty miles.

Such a great number of failures, without attaining any part of the object for which the different expeditions were sent out, was sufficiently discouraging to prevent a renewal of an enterprize that was only productive of mortification to the navigators, and disappointment to the government. Extraordinary, however, as these failures have been, it is presumed that the account of my recent voyage to this country will prove, that the coast is not inaccessible at the present time; but, on the contrary, that, under sufficient enterprize, and in certain positions, it might be visited annually. If the coast, from the Arctic Circle to Cape Farewell, be really defended by a barrier of ice that is impenetrable, of which I have very great doubts, the course to be pursued must be a parallel betwixt the latitude of 69° and 75°, in some part or other of which limits, and frequent-

ly in many different places, it appears to me the coast may be reached every summer. And, when the navigator once gets betwixt the ice and the land, there would be no great difficulty, I apprehend, in reaching any of the stations of the old colonies, even down to Cape Farewell, the southern promontory of Greenland.


A CHART
SURVEYS AND DISCOVERIES
GREENLAND
Gallia of Liverpool
REFERENCES.

JOURNAL, &c.

CHAPTER I.

PROCEEDINGS DURING THE PASSAGE FROM LIVERPOOL TO THE FISHING-STATIONS.

THE ship Baffin of Liverpool, under my command, was equipped for her third voyage to the Greenland whale-fishery, in the spring of the year 1822.

On the 18th of March, the crew, consisting of a complement of 50 men, was completed, and *mustered* by the Tide-surveyor of the port, according to the legal form required for whale-ships. On the 22d, we cleared at the Custom-house; but were prevented from sailing by strong westerly winds, which prevailed for several days.

Wednesday, 27th March.—The weather being fine and moderate, and the wind rather fa-

vourable than otherwise, we made the signal for sailing, though quite doubtful whether we should be able to proceed to sea or not. At half-past twelve we passed the dock-gates, and warped out to the pier-head, from whence we took sail, and stood into the river. Finding all hands on board, excepting two, a deficiency which I had fortunately provided for, by engaging two men in addition to our usual number, we reached down the river, and, on the ebb, worked out of the Rock Channel with the wind at WSW *. At this time, nearly 500 sail of ships were lying in the different docks wind-bound; but scarcely any of them attempted to put to sea on this occasion, as the wind was not suitable for the *South Channel*, the outlet most suitable for the voyages to which the principal part of the fleet was destined.

The pilot left us at the Floating-light, at 6 P. M.

In the night, we had strong gusts of wind from

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* All references to points of the Compass, throughout this Journal, it should be observed, are subject to a correction of from two to four points towards the West, for the Variation, excepting where an accurate bearing or direction was of consequence: in this case, corrections, both for "deviation" and "variation," have been made, and are invariably distinguished by the word "True," connected with the bearing or direction then mentioned.

the SW: so that, by carrying a pressure of canvas, we were enabled to weather the Calf of Man at 10 A. M. of the 28th. Proceeding down the North Channel, we passed Copeland Island at sunset; and at 11 P. M. were near the light on the Point of Corsewall, at the entrance of Loch Ryan. The wind having veered to NW., we kept this light under our lee during the night, that we might take shelter in Loch Ryan in the event of bad weather. The morning of the 29th, however, proving tolerably fine, we attempted to proceed on our voyage. In the evening, the wind came from the SW. and was attended with heavy rain and fierce squalls; but being favourable, we passed the Mull of Cantyre at sunset, and directed our course for the lee of Rachlin Island. The ebb-tide having swept us considerably to the northward, our situation soon became extremely critical; for the wind increasing to a hard gale, and a heavy sea setting in from the westward, we were rapidly impelled towards the dangerous rocks, islets, and headlands forming the northern coast of the Channel. As we had no alternative but to advance, we were under the necessity of carrying a pressure of sail, with the hope of clearing the Mull of Kinho, and Point of Runs, with the rocks, that were still more to be feared, lying farther towards the northwest. There being no

light to warn us of dangers, which the extreme darkness of the night prevented the possibility of discovering in time enough to avoid them, there was every occasion for apprehension and anxiety. The feelings excited by the sudden and unexpected involvement in a danger so threatening, were necessarily augmented by the contrast the mind naturally drew, between the present circumstances, and those of only three evenings prior to this time: *Then*, surrounded by all the blessings of life,—in the bosom of an affectionate family,—in the midst of a circle of refined and enlightened friends,—and partaking of all the rational and delightful enjoyments that can render life happy and valuable: *Now*, exposed to all the violence of the tempest, and, under the augmenting influence of anxious uncertainty and bewildering gloom, threatened with the horrors of shipwreck on a leeward shore!

Towards the approach of daybreak, our apprehensions respecting the northern shore, which must have been extremely near, were relieved by the veering of the wind to the W. and NW.: we immediately wore to the southward, and were enabled to lead off the land. At 8 A. M. the wind chopped round to the northward, and blew tremendously. As soon as the haziness of the weather had so far dispersed that we could recog-

nise the land, we bore away up Channel again for Loch Ryan, where we came to an anchor opposite The Kern, in shallow water, at five o'clock in the afternoon.

Sunday, 31st March.—Fine weather, with more moderate wind. Several vessels that had taken shelter along with us in this commodious bay, put to sea, being designed for the South Channel, for which the wind was fair.

We had Divine Service on board, morning and afternoon, after the ritual of the Church of England, as adapted to the circumstances of seamen, in the "Seaman's Prayer Book." In the evening, we had also our usual religious exercises with the apprentices, consisting of reading the Bible, singing, and prayer: about fifteen of the officers and sailors also attended. I had a demand for all the Bibles (twelve in number) committed to my care by the Liverpool Marine Bible Society, for sale among my crew, at one-half the cost prices, together with a few testaments furnished by the same Society.

The wind continued in an adverse quarter during the whole of the week, and detained us at our anchorage.

Loch Ryan is a safe and commodious retreat for ships bound to the westward or northward. It is of so easy access, that pilots are seldom re-

quired to bring vessels in. The usual anchorage is abreast of the upper houses in the village of The Kern, about three miles up the Loch, where the ground is tough, and affords secure fastening in seven fathoms. The best anchorage is within three cables' length of the eastern shore; the western part of the Loch being shallow. Small craft frequently take shelter at Stranraer, at the head of the bay, and large vessels may bring up above the "Scar;" but the outlet from thence is not so easy. There is seldom much sea sets in so high up as The Kern; but the annoyance from the tide, which runs two or three knots at the springs, is occasionally considerable. The soundings being regular in the Loch, strangers may beat in or out under a favourable tide, guided only by the lead, without any particular risk. The deepest water lies near the eastern shore; so that large ships running into the Loch at low-water, should pass within a cable's length of the Kern Point, which is very steep. A bank or "scar" stretches from Kirkholm Point on the west side, a mile and a half towards the south-east, and extends about two-thirds across the Loch: a rock lies a cable's length or more off Fennart, on the east side, and another a short distance from the Point of Corsewall, on the west side of the Loch; but these are almost the only dangers.

The peasantry and fishermen inhabiting the borders of Loch Ryan are an inoffensive and unobtrusive people. Unless they are invited, they seldom board the ships lying at The Kern, and are rarely either craving or troublesome when they are required to traffic. Their chief occupations are fishing, dredging for oysters, and a little agricultural labour. Numbers of boats were seen daily employed in the oyster-fishery. The oysters they take, which are generally of a small kind, are sold for 8d. a hundred.

During the leisure afforded by our detention at Loch Ryan, I employed myself in constructing a temporary apparatus for obviating the errors produced in the rate of chronometers, by the action of terrestrial magnetism on those parts of the instruments which are formed of steel. This action on chronometers, whose balances have accidentally acquired magnetic properties (and there are scarcely any that are not more or less magnetic), is considerable, and is probably the principal cause of the difference of the land and sea rates of these instruments. The general mode in which this disturbing cause acts, is sufficiently obvious. With regard to a magnetic balance, it is evident, that when the chronometer is in such a position that its north pole is directed towards the north of the globe, its rate will be accelerated,—when

towards the south, retarded;—in the same way that the vibrations of a compass-needle are accelerated or retarded, when near a magnet, accordingly as dissimilar or similar poles are presented to each other. The changes, in the rates of chronometers, arising from this cause, are very various, depending not only on the degree of magnetic energy of the balances, but also very materially on the positions of the instruments when their land rate was determined. It will sometimes happen, that the rate is taken in a position where the magnetic axis of the balance coincides pretty nearly with that of the earth: the error, in such a case, will be a maximum; because, at sea, the position is so varied by changes of course, as to have a tendency to produce a mean action, and a mean rate. All chronometers, therefore, when rated on shore, should be tried in at least four different positions, such as with the 12 o'clock mark presented to the four cardinal points. This would evidently afford a mean rate that would greatly enhance the value of the instrument, by giving it the best chance in the event of a change in its going.

With the assistance of Mr Thomas Davies, of the firm of Litherland and Davies of Liverpool, I have made a number of experiments on the change of rate in chronometers by posi-

tion. Twelve or fourteen chronometers, some of London, but principally of Liverpool manufacture, were put under trial for nearly two months, and the position of each was changed about once a-week. In about one-half of the number, a sensible alteration of rate occurred with every alteration of position. I have been favoured with the rate of all these, taken by Mr Davies, with a transit instrument by Troughton; or, in the absence of the sun, by the mean of two good "regulators."

In a pocket chronometer by Allen and Caithness, the rate was very uniform in two positions (namely, with the 12 o'clock mark towards the NE. and SW.); but, on shifting it from NE. to SE., a change of 1″.5 took place in its rate. In another chronometer by Hatton, there appeared to be a difference of rate of about a second in two opposite positions. In a one-day chronometer by Litherland and Davies, there was scarcely any perceptible variation in three positions, namely, N., S. and E.; but, on the 12 o'clock mark being directed towards the W., a change of one second per day occurred. In another instrument by the same makers, between the NW. and SE. positions, there was a difference, by the first experiment, of 2″.3 per day, and by the second experiment, of

1″.1. In an eight-day chronometer, by Margetts, there was also a sensible effect produced by an alteration of position. But the most extraordinary result was with an eight-day chronometer by Litherland and Davies. When the position was kept uniform, the rate of this instrument was very fair; but, on shifting it from NE. to SW., it was retarded 4″.4 daily. On restoring it to its first position, it was again accelerated even beyond its former rate. The same change was repeatedly made; and, in all cases, an alteration of from 4″.4 to 9″.5 per day occurred; and, in every instance when the change was made from NE. to SW., the rate was retarded; when the contrary way, accelerated! Between the positions of SE. and NW., there was also a difference of rate, but it was not very considerable.

As the experiments with the last instrument were by far the most decisive, I was desirous of examining the balance,—a wish that Mr Davies very readily gratified. It was found to be strongly magnetic, acting with great energy on a small needle, at the distance of more than an inch. The balance of another chronometer by the same makers, whose rate in all positions was remarkably uniform, was also examined, and it was satisfactory to find that it was entirely free from magnetism.

Although a change of rate occurred with each alteration of position in most of the chronometers, it should be observed, that the same change of rate did not always recur with a repetition of an experiment in all respects apparently the same. In some cases, indeed, the changes were altogether anomalous.

One plan of obviating this source of error in small chronometers, it occurred to me, might be accomplished, by preserving their uniformity of position, by means of a floating needle. For this purpose, I placed a chronometer in a light case of card paper, supported by a long pin or point, in a compass-bowl, on a little cross of thin brass, from the arms of which was suspended a perforated rhomboidal compass-needle. This needle, I found, though only of the ordinary magnitude, was fully capable of traversing with a weight of from a pound to a pound and a half, and with great facility, when loaded with a full-sized pocket chronometer. It therefore had the property of keeping the chronometer invariably in the same position, and, being suspended on gimbles, of preserving it from the bad effects of the motion of the ship at sea. The magnetic needle was hung five or six inches below the chronometer, so that its influence on the instrument was not greater than that of the earth; and, being in an opposite direc-

tion, had a tendency to neutralize, rather than add to, this disturbing cause. As far as could be determined by experiments made in smooth water, the apparatus promised to answer all the required purposes.

Sunday, April 7th.—There being no church within six miles of The Kern, I sent a boat to the village in the morning, to invite any of the people on board who might be disposed to join us in our usual Divine Service. About fifty persons came from the shore, at a few minutes notice, and the captains, with several of the crews, of two vessels lying near us. The day being fine and mild, the Service was performed on deck.

In the evening, the wind veered to NE. and blew fresh: the flood-tide, however, having begun to run up, we were obliged to remain at anchor during the night; but, at day-break, we weighed, and beat out of the Loch, and then stood to the NW. The day proved fine throughout, the wind varying between ENE. and N. We passed the Mull of Cantyre at 3 P. M., and, assisted by an ebb-tide running to the NW. through the channel, weathered Rachlin Island before sun-set. The returning flood carried us considerably down upon the Irish shore, and obliged us to tack.

On the 9th we made but little progress. On

the 10th, we passed near the dangerous rocks and islands of Skerivore, lying about 16 miles SW. of Tiree Island; and the following morning, at day-break, descried the Island of St Kilda, which we passed at noon. An azimuth of the sun, obtained this day, gave the variation only 23°, instead of 32°; the difference, therefore, amounting to 9°, was the effect of the *deviation* when on a NNE. course, which is a very uncommon quantity.

The ship being now fairly at sea, the ship's company were divided into three "watches," containing an equal proportion of harpooners, boat-steerers, &c. This arrangement, which the large complement of a Greenland ship's crew renders easily practicable, gives each man, excepting on extraordinary occasions, 16 hours rest out of 24. This is a great relief to them in cold weather, and serves to compensate them for the extraordinary exertions to which they are sometimes called. At the same time, we appointed a crew of six or seven men for each of our seven whale-boats, for the purpose of getting them fully prepared and fitted for the fishery, and for keeping them in order when on service.

On the 13th, we passed to the westward of the Faroe Islands, and at no great distance; but the weather being hazy, we did not see them.

To my great surprise, I was informed at day-

break of the 14th, that a piece of ice had been passed; and soon afterwards, that some "brash-streams" were in sight, which induced us to tack, with the wind at ESE., and stand to the southward. The influence of ice in producing fogs was, on this occasion, strikingly exemplified. We had, indeed, experienced hazy weather for a day or two before; but, on our approach to the ice, it became more and more dense, until it obtained the usual obscurity and character of the Arctic fogs. I never before saw ice near this position, being about 150 miles to the eastward of Iceland, and in so low a latitude as 64°.30′N. It must have been brought hither by a continuance of strong gales from the NW. Its effect on the climate of Iceland, the whole of which island the ice appeared at this time to envelope, must have proved both disagreeable and baneful to the inhabitants. In summer, the ice generally retires far from the coast; but during the preceding 18 months, it is probable that the northern parts of the island were never free from its chilling influence. Towards the end of August 1821, a season when the ice should have retired to its greatest distance from the shore, I found the promontory of Langaness encompassed by large streams of heavy drift-ice, which, it appears, never left the coast the whole of the summer. The effect of this

on the temperature was most striking. In descending from latitude 71° to 67°, the highest observation of the thermometer was 38°, and when close in-shore, near Langaness, it was 35° at mid-day, and 32 early in the morning. It might be reasonably expected, that such a degree of cold in the height of summer would be destructive to vegetation, and, consequently, most dangerous to the cattle, whose supply of herbage in this quarter is at all times scanty; yet, in the interior, we are informed, by the Danish journals of the period, that the summer of 1821 was uncommonly warm.

April, 15th.—At day-break we stood in with the ice; but were soon stopped in our farther progress to the eastward, by a heavy and extensive patch of compact ice. After plying several hours to the southward, with the hope of being able to double it, I found it still extending to windward, as far as the eye could discern from the mast-head. As it appeared to be merely a point of ice jutting out into the sea towards the south, and was, in some parts, of no great breadth, I determined to attempt to force a passage through it. We accordingly put the ship in contact with the narrowest part of the ice, through which, though it was very hard and heavy, and considerably agitated by the swell, we accomplished a passage in about an hour. Some seals were seen on a few of the

detached pieces of ice; but the number was not sufficiently tempting to induce us to stop for them with a fair wind.

Steering E by S., we soon got clear of the ice; and in the evening proceeded to the ENE. The weather all day was beautifully fine and clear, excepting a slight haze near the horizon, being the condensation of vapour by the coldness of the ice. The latitude at noon was 64°. 41′., and the variation of the compass, ship's head east, 30° westerly. An hour or two before midnight, we had a most splendid aurora borealis. It commenced in the north, and extended itself in an arch across the zenith, towards the south. A sort of crown was then formed in the zenith, which was most brilliantly illuminated, and gave out innumerable coruscations of great beauty, and with astonishing velocity. The light appeared to be equal to that of the full moon; and various colours, particularly blue, green and pink, were stated by my officers to have been clearly observed. Its extreme distinctness, and the boldness of the coruscations, seemed to bring it to a low elevation; and, when the rays were darted towards the ship, it appeared almost to descend to the very mast-head.

Between the parallels of 62° or 63° and 70°, the aurora borealis is of very common occurrence, in the spring and autumn of the year.

On the 3d of April 1820, I observed the most interesting display of this meteor, that nearly forty passages to and from the fishery had afforded. The evening was fine and clear, the wind westerly. The aurora first appeared in the north, and gradually extended in a luminous arch across the zenith, almost to the southern horizon. A dim sheet of light then suddenly appeared, and spread over the whole of the heavens to the eastward of the magnetic meridian, while only a few insulated specks were visible to the westward. The eastern auroræ were grey and obscure, and exhibited little motion; but the arch extending across the zenith, showed an uncommon playfulness of figure and variety of form. Sometimes it exhibited a luminous edge towards the west, in some places concentrated into a fervid brilliancy. The rays were a little oblique to the position of the arch; but generally parallel to each other, and commonly ran in the direction of the magnetic north and south. At one time they extended sideways against the wind; at another in the contrary direction. Now they shot forward numerous luminous pencils, then shrunk into obscurity, or dispersed into the appearance of mere vapour. The colours were yellowish-white and greyish-white. All the stars of the fourth magnitude were visible through the meteor, even in its most

vivid coruscations. *Ursa Major* was at one time encircled with such a characteristic blazonry of light, that the Bear seemed to spring into figure, and to be shaking his shaggy limbs, as if in contempt of the less distinguished constellations around him. The Pleiades were almost obscured by the light produced by the aurora; though Venus, and all the superior stars, shone with becoming splendour. I have never been sensible that the shooting of the aurora was accompanied by any noise: the turbulence, indeed, of the water at sea, or noise of the sails during calms, prevents slight sounds from being heard.

For some days after the aurora borealis, the weather was uncommonly fine. The wind was generally moderate, with frequent calms. During a run of fifty leagues, the sea was constantly of an olive-green colour, remarkably turbid; but in the afternoon of the 17th of April, it changed to transparent blue. The green appearance of the sea in these latitudes, I formerly ascertained to be occasioned by an innumerable quantity of small molluscous animals, of a yellowish colour, contained in it. A calculation of the number of these animals in a space of two miles square, and 250 fathoms deep, gave an amount of 23,888,000,000,000*.

* Account of the Arctic Regions, vol. i, p. 179.

Our latitude on the 17th was 65° 58′, longitude 3° 53′ W. A great quantity of drift-wood was passed during this day. Sometimes two or three pieces were seen at once. We picked up two trees, one of which was above thirty feet in length, perfectly straight, and well adapted for a jib-boom. This great supply of drift-wood is probably derived from some of the extensive rivers of Siberia, which empty themselves into the Frozen Ocean; and being carried by the westerly current, prevailing on this coast, is dispersed throughout the Greenland Sea. All the drift-wood I have examined was of pine; some of it of small diameter, the growth of centuries: but birch-trees have, I understand, been also met with. It is not uncommon to find trees standing erect in the middle of large sheets of ice,—a circumstance which is in favour of the supposition of such ice having been formed near land. In the summer of 1821, I found several pieces of timber thus situated. One of these that we hewed down (being so firmly embedded in a floe, that we could not otherwise remove it) was remarkable for the fineness of its grain or texture. It was a portion of a fir-tree, twelve feet in length; and although no more than six and a-half inches in diameter, it appeared, from the number of concentric rings observed on cutting it transversely, that it had been above

200 years in attaining this size. This extreme slowness of its growth, seemed to mark it as the product of a very high latitude. Many of the drift-trees that I have seen near Spitzbergen, retained the roots: some seemed to have been torn from their hold by torrents; but others, having the marks of fire upon them, near the roots, appeared to have had this agent applied to them for their removal.

On the 18th, in latitude 66°49′, longitude 3° W. we again fell in with ice. As I considered the spring too far advanced for the seal-fishery, which is generally the most profitable about the end of March or beginning of April, I was desirous of reaching the higher fishing stations with as little delay as possible. For this purpose, it was necessary to keep at a distance from the ice,—since the prevalence of east and south-east winds at this season, is frequently the means of altogether detaining vessels caught on the face of the ice, whilst others in the offing accomplish their passage up to the fishing stations. By steering sufficiently to the eastward, below the 72d degree at least, detention from this cause may almost certainly be avoided; as the ice follows pretty nearly the direction of the east coast of Greenland, and adheres to this shore, leaving the opposite coast of Norway always free. We, therefore,

steered NE by N. (true), a course nearly two points more easterly than we should have pursued in a perfectly clear sea. In this parallel, it may be observed, that the ice usually lies ten degrees to the eastward of the situation in which it this season appeared.

The following day at noon, having had a good run during the night, I observed in latitude 68° 45′, and longitude by chronometer 0° 8′ W. The variation was found to be only 14° W., on a NE by E. course; but the real variation must have been about 22°, the difference of 8° being the effect of the "local attraction" of the ship on the compasses. The amount of "deviation" on every point not being yet ascertained, nor the points of change, we sailed in considerable uncertainty, whenever an alteration in the course was necessary. The Baffin having an iron-tiller, and much heavy iron-work about the rudder, has an extraordinary deviation in her compasses. In her first voyage (1820), it was still more considerable, and not a little dangerous before it was discovered. It produced an error of a degree of latitude in one day's run, on a NE by E. course,—the deviation on that point being twenty-two degrees. On carrying a pocket compass round the quarter-deck, to ascertain the cause of attraction, I discovered that it was principally owing to the piping or chimney

of the cabin-stove, which had inadvertently been made of sheet-iron, and had consequently an attractive energy (according to Mr Barlow's investigations), equal to a pillar of solid metal, of the same quality and diameter. On removing this chimney, though eight feet distant from the binnacle, the deviation was diminished more than two-thirds.—Saw a number of small whales of the the Dolphin genus (*Delphinus deductor* of Dr TRAILL), some of which followed the ship, and came within pistol-shot. A great quantity of kittywakes (*Larus rissa*) were also about us. In many places the surface of the sea was marked by large shining veins, the effect of an oleaginous exudation, probably either of the dolphins or of the fishes on which they feed.

On Sunday the 21st of April, we had a hard gale from the NE. and NNE., which being directly against us, put us under close-reefed topsails and courses. As we were warned of this gale, by the fall of the barometer, we made all snug the night before it came on, and were fully prepared for it.—Had Divine Service, as usual, morning and afternoon, with the religious exercises of the apprentices in the evening.

The wind moderated at sun-rise of the 22d, and veered to the south-west; but as the sea continued to run remarkably heavy, we obtained very little advantage from the fair wind.

In consequence of the violent flapping of the sails, during a calm which occurred in the night, the leach-rope of the fore-top-sail gave way, and the sail was a little torn. While the calm continued, it was unbent, repaired, and restored to its place. In the afternoon we had a fresh of wind, and the weather, which had previously been clear, became dark, showery, and threatening: in the evening the wind increased to a smart gale. A little before sun-set, a *weather-gall* (or the limb of a rain-bow), of extraordinary brilliancy, appeared. It seemed to me that all the colours of the spectrum were repeated two or three times in succession, and in close connection with the primitive arch, which was on the exterior of the bow. A double set of colours was certainly perceptible; and, when at the brightest, there were evidently either three or four concentric yellow arches, and I imagine, also, as many arches of the other colours of the spectrum; but the yellow only was distinctly visible, excepting in the second arch. The interior arches diminishing successively in distinctness, had the appearance almost of the cloisters of a cathedral, as exhibited in a transparency, where they recede into the obscurity of distant perspective. These spectra rose only to the altitude of 4° or 5°. They took their rise from the surface of a cloud of dismal appearance and

density, within the horizon. The weather-gall is generally considered by seamen as the harbinger of a storm.

The following day was stormy; wind easterly. Our latitude at noon was 71° 56′, and the longitude given by the chronometer at 5h 58′ P. M. was 8° 9′ E.: my reckoning gave 6° 25′ E. The difference 1° 44′ is not surprising, when it is considered, that the deviation, though evidently great, was not known, and that the point of change was probably different from what it had been on any preceding voyage.

On the 25th, I observed in latitude 75° 5′, and early the following morning fell in with ice. We proceeded to the northward, among loose pieces and streams, until we got considerably involved. Supposing it to be the land-ice of Spitzbergen, that generally skirts the western coast in the spring of the year, even in *open seasons*, we hauled out to the north-west, which soon relieved us, and enabled us again to bear away to the northward.

For two or three nights preceding this, we had had no darkness, but only a faint and diminishing twilight. Now we were advanced into the region of continued day, where the sun for months together sweeps round the Northern Pole without ever descending below the horizon.

Having now reached "a fishing latitude," we took two boats out of the 'tween decks, where

they were stowed on the passage out for safety, and commenced our preparations for the fishery.

The number of our boats was seven. In each of these we coiled six *whale-lines*, of 120 fathoms, amounting to above three-quarters of an English mile in length, for one boat. They were also fitted up with all the apparatus of harpoons, lances, oars, axes, flags, &c. as usual in their equipment *.

April 27th.—We continued to advance towards the north with some caution, the weather being hazy, until 5 A. M., when we fell in with ice, supposed to be the western body: stood across to the eastward, in a clear sea, until noon, when we came to the eastern ice; and, at the same time, descried land, at the distance of four or five leagues. Standing along the edge of the compact ice, towards the NE. we passed the 80th degree of latitude at 5 P. M., being within 10 miles of Hakluyt's Headland,—an elevation which we reached without experiencing any frost! Here we saw a number of sea-horses lying upon different masses of ice. We were enabled to approach two of them with the ship, one of which was fired at and struck with a ball; but not being shot in a vital part, it made its escape, as well as its companion.

* See Account of the Arctic Regions, vol. ii. p. 230, for a description of the Preparations for the Fishery.

In the evening, the wind coming off shore, the sky immediately became clear, and showed us a large extent of the northern coast of Spitzbergen. This coast is much lower land than the western, and more uniformly covered with snow, few ridges, or even points of naked land, being visible. The western coast, on the other hand, presents alternate streaks of black and white. The former colour, consisting of ridges of naked rock, which appear black, contrasted with the brilliant whiteness of the snow, frequently runs from the summit directly towards the base of the mountain, but oftener becomes concealed beneath a bed of snow and ice, as it approaches the water's edge: the latter colour, the white, consisting of snow or ice, fills all the ravines, dells, fissures, and valleys, and reflects the light of the sun with such intensity, that the tracts of snow-clad land exhibit, as near as possible, the colour and splendour of the moon at the full. The ice and rocks being thus highly illuminated, and strongly contrasted,—being constructed on a majestic scale, and rising with peculiar steepness out of the sea,—give a character to the Spitzbergen scenery highly striking, interesting, and indeed magnificent.

As soon as we passed to the northward of Cloven Cliff, the north-western land of Spitzbergen, the whole of the northern coast was seen through

a highly and unequally refractive medium. In consequence of this, the cliffs were reared to an uncommon altitude, and presented the beautiful basaltic character, which it is a general property of this remarkable state of the atmosphere to produce. The apparent columns were all vertical, or nearly so, and, when slightly waved, maintained their parallelism, the curvature of the adjoining columns corresponding with each other.

The ice upon this coast was of the drift kind, consisting of irregular masses of various height and thickness, closely packed together, or perhaps frozen, in the interior, into extensive sheets. This barrier of ice, skirting the coast, prevented our access to the shore.

During the passage from Liverpool to this situation, nothing new in the zoological department was observed. Near the Lewis, several stormy petrels *(Procellaria pelagica)* were seen; and off Feroe, a number of gannets *(Pelecanus bassanus)*. Fulmar petrels *(Procellaria glacialis)* were always about us after we left the Hebrides; and some of the same birds appeared to accompany us for many degrees of latitude. Kittiwakes *(Larus rissa)* were seen in great abundance; and arctic gulls *(L. parasiticus)*, burgomasters *(L. glaucus)*, and snow-birds *(L. eburneus)* were occasionally hovering near us.

On our approaching the coast of Spitzbergen, roaches *(Alca alle)*, dovecas *(Colymbus grylle)*, looms *(C. troile)*, terns *(Sterna hirundo)*, snow-buntings *(Emberiza nivalis)*, &c. began to make their appearance.

CHAPTER II.

APPROACH TO WITHIN FIVE HUNDRED AND SEVENTY MILES OF THE POLE,—EXPERIENCE INTENSE COLD,—COMMENCE THE WHALE-FISHERY,—SHIP BESET,—EXPERIMENTS ON THE DEVELOPMENT OF MAGNETISM, BY A NEW PROCESS.

We continued to approach the Pole, in a sea clear of ice to the NW. and W., until one in the morning of Sunday, the 28th, when, in latitude 80° 30′, we were stopped by the main northern ice, appearing to be a solid impervious "pack," trending, as far as the eye could discern, to the NW. and SE. Here we remained standing off and on, or lying to, the most of the day, with the intention, after the conclusion of the Sabbath, to proceed to the eastward, along the northern face of Spitzbergen, in search of whales; but an unfavourable change of wind prevented this object from being accomplished. In the afternoon it fell calm. Snow began to fall, and the barometer subsided to 29°40′. Expecting a gale of wind, we stood from the ice to the southward, with the first breeze; but, before we could gain a sufficient offing, a gale overtook us, and put us under close-reefed top-sails. The

wind blowing dead upon the ice, and the sea becoming very heavy, we found our situation a very critical one; but the gale not increasing to such a degree of violence as I had anticipated, or as the height of the sea intimated, we were enabled to keep off the ice, standing to the NW.

The next morning, the wind moderated, and a heavy fall of snow commenced. These circumstances, with a low barometer and heavy sea, indicated a renewal of the gale from another quarter, and prevented us from spreading more sail. It was fortunate we did not, as the wind at 8 A. M. chopped round to the northward, and presently blew much harder than before. This sudden change of wind was the occasion of the most remarkable fall of temperature I ever witnessed. At 8 A. M., just before the change of wind occurred, the thermometer was at 32°, and the decks were covered with wet snow. The instant the north wind began, freezing commenced (the first we had had during the voyage) and, in less than two hours, the thermometer was at 14°, being a fall of 18°! At 8 P. M., the temperature was down to 6°, being a reduction of 26° in 12 hours; and, at midnight, it was — 2°, being a fall of 34° in 16 hours!

Such a sudden and remarkable increase of cold was necessarily productive of great inconvenience, especially as it was accompanied by a hard gale of

wind. But, having stood to the eastward, until we had smooth water under the lee of the northern ice, we were enabled to keep up brisk fires, and to have the cabin-door shut, in consequence of which we suffered very little from the cold when below. Had the sea been heavy, we should have required a free admission of air for the prevention of smoke, which would have rendered the cabin almost intolerable. The extraordinary habiliments provided by the sailors for defence against cold, were now brought into requisition, and various and grotesque were the costumes to which some of them resorted.

At mid-day, the meridian altitude of the sun gave the latitude 80° 31′; the longitude, at the same time, was 8° E.

We tacked at the northern ice, at 1 P. M., and, during the latter part of the day, stood along its edge, which we found pretty nearly straight, and trending towards the WNW. The *frost-rime* (a vapour arising from the sea in severe frosts) was so thick that we never had a view of the ice beyond its exterior margin. This kind of fog, peculiar to high latitudes, seems to arise from a similar cause to that which occasions the visible evaporation of water, whenever heated much above the temperature of the air. The sea, on occasions of frost-rime, is generally about 20° or 30° warmer

than the air; a sensible evaporation is produced, which being condensed as it rises, freezes at the same instant, and, being in exceedingly small particles, is dispersed through the lower parts of the atmosphere by the wind, and is productive of the most annoying obscurity *. Frost-rime, of the greatest density, it is observed, only occurs during strong winds, and increases (under similar temperature and humidity of the atmosphere) as the turbulence of the sea increases; but if the air be calm, it diminishes to a low and thin stratum of vapour. I was long in doubt whether the freezing of the sprays and froth of the waves, or the evaporation of the sea, was the cause of the meteor. Having, however, taken a large shallow vessel of water into the open air, and placed it in a situation sheltered from the wind, at a time when the frost-rime was particularly dense, the thermometer being at zero, I observed that this water, though perfectly still and unruffled, soon began to discharge a thin vapour, resembling the frost-rime, which it continued to give out, until the surface was covered with ice. This experiment convinced me that the cause must be simply evaporation.

* See Account of the Arctic Regions, vol. i. p. 434. for a more particular description of this meteor.

All the harpooners (seven in number) were invited to dine with me. I usually call them together on our entrance into fishing-stations, to deliver to them such instructions as my own views of the business,—the success of our exertions,—and the liberal treatment of other adventurers who may happen to become our competitors,—seem to require. On this occasion I urged them to activity, perseverance, and unanimity among themselves:—to a benevolent exertion for the assistance of all ships, of all nations, to whom it might be useful, whenever that assistance could be rendered, without evident detriment to their own prosperity; and gave them a code of rules to assist their judgment in cases of difficulty or danger.

April 30th.—Meeting with ice a-head, at midnight, the position of which the intense thickness of the frost-rime prevented us from ascertaining, we tacked, and stood off and on during the night. Towards noon the gale abated, and the frost rime became attenuated. The sun broke through the clouds at the same time, and produced a powerful effect on the temperature. At 2 A. M. the thermometer was 3° or 4° below zero; at 8 A. M. it was + 6°; and at 10 A. M. about 14° in the shade. But the genial influence of the sun was still more striking. In a sheltered air, it produced the feeling of warmth; the black-paint work

of the side of the ship on which the sun shone, was heated to the temperature of 90° or 100°, and the pitch about the bends became fluid. Thus, while on one side there was uncommon warmth, on the opposite was intense freezing *.

As soon as the dispersion of the frost-rime disclosed to us the position of the ice, we were again enabled to proceed to the westward, following the trendings of the northern ice, between a NNW. and a W. course.

The evening was fine; sea calm and beginning to freeze.

May 1st.—The 1st day of May is usually ushered in by the Greenland sailors, by the suspension in the rigging of a garland of ribbons, attended with grotesque dances and other amusements, and occasionally with ceremonies somewhat similar to those commonly practised in crossing the line. It affords opportunity for the display of feats of activity or strength; for the practice of such kinds of harmless frolic, as the circumstances of a whaling voyage will admit; and for the development of that species of original and frequently extraordinary wit, peculiar to the sailor. Not having any particular taste for witnessing these scenes, I did not turn out at the time when the ship's company

* Latitude at noon, by observation, 80° 19′; Longitude, by account, 3° E.

were all busily engaged in the performance of their various parts in the humours of the day. As, however, it may serve to show the taste of the sailors for *dramatic effect*, and something of their originality and wit, I shall transcribe an account of the transactions of May-day morning, from my journal of 1820, when the occasion was celebrated with remarkable spirit.

The proceedings commenced on the striking of eight bells at midnight, by the suspension in the rigging of a garland (very gaily decorated with ribbons, and surmounted with a representation of Neptune, and emblems of the fishery), by the hand of that individual among the crew who had most recently entered into the state of wedlock. Another sailor, strangely metamorphosed in a garb studiously extravagant, was then heard to hail the ship, ordering the main-yard to be braced aback, and a rope to be given for his boat; and immediately afterwards the odd figure, representing Neptune, with his wife, a barber, and his mate, ascended the deck over the bows of the ship. All hands were now summoned by this assumed marine potentate; when each individual, as he passed before him, received from the barber distinguishing patches of black and white upon his face. His marine majesty then went below, and entered into a division screened off from the 'tween-decks, for

the occasion, and ordered all the hands, who were not free of the Greenland Sea, to come before him. One at a time they were brought into his presence, and each submitted to his humorous interrogatories, and to the coarse operation of shaving. As the non-freeman entered, he was received with seaman-like courtesy by his majesty, whose solemn demeanour and grotesque habit, and whose efforts at politeness and most awkward bows, were as much at variance as any specimen of the ludicrous could well present. Neptune was a striking figure; his back carried a huge hunch, and his swollen bandied legs rivalled the diameter of his body. He was clothed in a naval dress, augmented by a cloak and an immense wig, of which a *swab* formed the tail. His assistant, whose office it was to perform the shaving operation, was dressed in a neat suit (with the exception of some embellishments) of white nankeen, and formed a singular contrast to his acknowledged sovereign. His lather was a mixture of soot, grease, tar, and other filth, scraped up for the occasion; a tar-brush was the utensil with which it was applied, and a coarse piece of iron-hooping, the substitute for a razor. When the lathering commenced, various questions were proposed by Neptune, respecting the man's occupation, station and country; and if the unlucky fellow happened to give an answer, the brush inva-

riably penetrated to his throat, and filled his mouth with its superabundant juices. The shaving of such as were decent, well-behaved and orderly characters, though at the best not very delicate, was, nevertheless, accomplished without any severity; but some who had shipped themselves as seamen, and proved to be not only unacquainted with the profession, but, at the same time, mean and worthless characters, were shaven with vast deliberation and coarseness. Two of these being introduced to Neptune in the character of *hypocrites*, were ordered by him to pass through two or three courses of the operation, on the principle, that, all hypocrites having two faces, it was necessary to scrape frequently and deeply, that the false face might be removed, and the true one appear! The shaving being concluded, and all hands made free, a sort of rude masquerade commenced. The characters were not numerous, but they were, in general, well supported. The introduction of a female character, the wife of Neptune, though any thing but lovely, gave occasion for battle, plot, and dramatic incident. This scene being passed, the ship's company were marshalled on deck and reviewed. Feats of agility by individuals succeeded; and some *tumbling*, which was commenced by an expert master of the ceremonies, was attempted by all hands,

though at the expence of many coarse thumps on the deck, which it required all their thick and varied clothing to defend them against. On one occasion of this kind, which occurred a few years ago, in a ship lying moored to a piece of ice in a calm; the force of example, and the desire of imitation went so far, that, on the leader's jumping on the rail of the ship, and crying out "follow me," a number of his comrades, some of whom could not swim, precipitated themselves with him into the sea! This frolic, though a dangerous one, ended without any mischief, as they all succeeded, with the help of their shipmates, in scrambling to the ice. After these feats of agility, a rude, but active and energetic dance succeeded, sustained or directed by the noisy vibrations of every kettle and pan to be found in the ship, but without any instrument more harmonious. The whole terminated with a loyal song, which was chorussed by the whole crew; and then they dispersed with three huzzas, on a summons from the boatswain to "splice the main-brace."

We had the wind from the SW. in the morning; but during the forenoon it veered to the NW. and subsequently to the NE. The extremes of temperature were 8 and 3 degrees on the deck; but at the mast-head, the thermometer at 2 P. M. was at zero. At mid-day, we were

in latitude 80° 23′ by observation; and at 5 A.M. I calculated that we had advanced to 80° 34′, a distance of only 566 miles from the Pole; when the freezing of the sea around us, and the increasing accumulation of ice to the northward, rendered any further advance at so early a season imprudent; and particularly as not a single whale had yet appeared, to encourage us to perseverance. We were now probably within a few miles of the extreme accessible point of the Greenland Sea towards the north; and the Baffin was, without question, in the highest latitude of any ship at that moment on the sea; and there was no doubt on my own mind, when I stood on the taffrail as the ship was turned before the wind, that I was then nearer to the Pole than any individual on the face of the earth. From this situation, the northern barrier of ice extended towards the SE. and ESE. and the main western ice towards the SW.; so that we were near the extremity of the angle formed by these two immense floating bodies.

We now proceeded along the edge of the western ice towards the SW.; streams of drift ice began to appear to the eastward at 2 A. M., and at 8, the sea about us was crowded with patches and detached pieces. Here we saw a considerable number of "unicorns" (narwals), several of which

had fine horns. Being nearly becalmed at the time, I dispatched a boat in pursuit; but they were so shy and active, that they all escaped us. The narwal being often the harbinger of the whale, and the green coloured sea, with the favourable character of the ice, affording an additional probability of finding whales, we cruized the whole of the day, when we had a breeze, among the intricacies of the ice, in search of these animals, the capture of which constituted the grand object of the voyage. Our researches throughout a fatiguing day and night, in a difficult navigation, were unsuccessful; but at two o'clock of the following morning, the first whale was seen. Though the weather was far from being fine, there being now a fresh of wind, with considerable sea, and thick snow, we could not resist the pursuit: two boats were therefore dispatched, which continued the chase for three hours, and then, the prey having escaped them, were recalled.

The two following days, we continued cruizing off the face of the western ice, and sometimes within streams and patches lying off the main body, which afforded us shelter during a gale of wind from the ENE. that prevailed on the 4th. On this day we descended to latitude 78° 26′; but having spoken a ship that had made fruitless

search, along with the greater part of the Greenland fleet, in a more southern latitude, we returned, as soon as the weather moderated, towards the north. This ship, the Volunteer of Whitby, with six sail in company, was the first we saw after leaving the coast of Ireland.

May 6th.—Having regained the latitude of 79° 31′, we penetrated the ice, consisting of innumerable detached masses, and occasional compact streams and patches, during the whole of the afternoon, towards the north-west. A small whale was seen in the evening, and next morning a larger one appeared near the ship. All hands jumped upon deck, wishful to aid in the pursuit; but before greater force could be brought into action, a boat first dispatched came up with it, and a harpoon was thrust into its back. So alive were the men to the business on this occasion, that, on the usual cry of "a fall," every boat was found to be already manned, and all were in a few moments afloat. The whale descended, and remained invisible for half an hour: on re-appearing at the surface, it was attacked with such ardour, that three other harpoons were almost immediately struck, and, after a short but energetic application of the lances, the huge animal, powerful as by nature its species is, yielded its life, and became our prize.

The ship being moored to a large sheet of ice, capable of preventing her from drifting to any considerable distance, the fat of the whale was stripped off; the whalebone and jaw-bones being also removed, the carcass was then liberated. This being the first capture, these operations occupied about six hours, instead of three or four hours, the time in which they ought to have been completed. Our prize was about 45 feet in length: the longest of the whalebone measured 9 feet 6 inches; the produce in oil was calculated at 13 tuns.

We had scarcely finished, before we found the ice, with a strong north wind, so rapidly closing around us, that an immediate escape became important. The sails were instantly set, and the ship got under-way, and, after five hours very difficult sailing among rather dangerous ice, we escaped into a pretty open sea. Within half an hour after we reached this situation, a strong and sudden gale came on from the NE. on which the thermometer fell from 26° to 12°, almost immediately.

The day following was windy, with intense cold, and thick frost-rime. Captain Johnstone, of the Aimwell of Whitby, breakfasted with me. Neither himself, nor any other ship he had met with, had yet taken any whales: he had indeed

seen but one since his arrival on the fishing-stations.

May 9th.—Again the wind increased to a fresh gale from the NE. and the weather became intensely cold. The deck thermometer was never higher than 2°, and sometimes as low as — 5°; at the mast-head, the temperature was below zero all the day. The greatest cold noticed in this situation was — 8°; which was the extreme of my observations during twenty voyages to the whale-fishery. The frost-rime constituted a dense stratum of mist 50 or 60 feet in altitude, so as to circumscribe the prospect from the deck to about 150 yards; while at the mast-head, where the observer could see over it, the limit was extended to a mile or upwards. This obscurity rendering the navigation among crowded drift-ice extremely dangerous, required my personal superintendence at the mast-head, where the temperature was from 3 to 8 degrees below zero, for several hours at a time. This intensity of cold, which was rendered excessively penetrating by the strength of the wind with which it was accompanied, was severely felt. There is little doubt but it was more painful to the feelings than a temperature of — 30° or — 40° would have been in a calm atmosphere. Though we had smooth water, and kept the companion-door constantly

closed, the cabin became more uncomfortable than the deck. Water spilt on the table, within three feet of a hot air-stove, became ice; washed linen became hard and sonorous; and mitts that had been hung to dry exactly in the front of the fire, (the grate being full of blazing coals), and only thirty inches distant, were partially frozen; and even good ale placed in a mug at the foot of the stove, began to congeal! A damp hand applied to any metallic substance in the open air, stuck to it; and the tongue brought into contact with the same, adhered so firmly, that it could not be removed, without the loss of the skin. Some of the sailors suffered considerably from partial frost-bites. The cooper had his nose frozen, and was obliged to submit to a severe friction with snow; and the boatswain almost lost his hearing.

About 7 P. M., and from that time until 9, there were two diffuse parhelia visible. Part of a prismatic circle, about 23° distant from the sun, surrounded this luminary: at the same altitude as the sun, and on the external margin of this circle, at the two extremities of its horizontal diameter, the parhelia appeared. At this time there were occasional small clouds passing over the sun, and discharging slight showers of fine granular snow, mixed perhaps with spiculæ: whenever the corona appeared on the face of these clouds, or im-

printed on the showers, it was distinct and even brilliant; but in the clear atmosphere towards the zenith, it was scarcely perceptible. The colours were not very definite: yellow, however, was observed to be on the exterior, and the darker colours towards the centre of the circle. The parhelia were elongate vertically. In fact, they seemed as if the two opposite outward edges of the corona, at the same elevation as the sun, were brilliantly illuminated, they consequently formed part of an arch; but the oblong speck in the middle was the most brilliant. The frost-rime was at this time so thick, as to render these appearances, from the deck, almost invisible.

As it blew hard all night, and the weather was intensely thick with frost-rime, it was not without unremitting watchfulness, and an active management of the sails, that the ship was kept clear of the ice, which surrounded us in innumerable masses. Some of these were of the floe kind, having a medial breadth of two or three miles. All the ice was in motion, and its relative position was perpetually changing, and endangering us.

The frost-rime becoming a little attenuated, next morning, I found that a body of drift-ice had descended from the north, in such a way, as to inclose us in a basin of water, scarcely a mile

in diameter, which was without any visible outlet. Two other ships were in company, and in the same predicament. Finding that we should certainly be *beset*, if we did not speedily escape, I kept a constant watch on the movements of the ice, and had all hands in attendance, for the prompt management of the sails, on which, the safety of the ship, under Divine Providence, depended. A partial avenue fortunately occurring about 11 A. M., we immediately slipped through it; but the ice closing rapidly, and the obstacles every moment becoming more formidable, we were under the necessity of immediately forcing into another barrier that opposed us; and after drifting or boring, by a pressure of canvas, for two or three hours, we at length obtained sailing room. We persevered to the eastward, tacking occasionally, until 6 P. M., when falling into a commodious opening of the ice, we laid the ship to. In effecting our escape from the place where we were hemmed in by the ice, I was obliged to be many hours at the mast-head. At one *spell* I remained about four hours, when the temperature was three degrees below zero.

The nautical operations of this day were of the most difficult kind which the whale-fishers have to encounter, and in which numbers of ships are annually damaged. Most of the masses of drift-

ice, among which we had to force a passage, were at least twenty times the weight of the ship, and as hard as some kinds of marble; a violent shock against some of them might have been fatal. But the difficulties and intricacies of such situations, affording exercise for the highest possible exertion of nautical skill, are capable of yielding, to the person who has the management of a ship, under such circumstances, a degree of enjoyment, which it would be difficult for navigators, accustomed to mere common-place operations, duly to appreciate. The ordinary management of a ship, under a strong gale, and with great velocity, exhibits evolutions of considerable elegance; but these cannot be comparable with the navigation in the intricacies of floating-ice, where the evolutions are frequent, and perpetually varying,—where manœuvres are to be accomplished, that extend to the very limits of possibility,—and where a degree of hazard attaches to some of the operations, which would render a mistake of the helm, or a miscalculation of the powers of a ship, irremediable and destructive.

The weather moderating on the 10th, we proceeded to the eastward, and northward, plying among open patches, and innumerable detached pieces of drift-ice, in search of whales; but without succeeding in our object. Our latitude was

79° 58′. The next day, being Sunday, our researches were suspended, for the usual observance of Divine Worship. Joined company with the John of Greenock, commanded by my brother-in-law Mr Jackson. Several ships that had been with us for several days, now bore away to the southward.

May 13th.—Immediately after the conclusion of the Sabbath, we hove to, reefed the top-sails, and took in all unnecessary sails, for the purpose of packing the blubber of the whale killed on the 7th, in casks. This operation requiring part of the two upper tiers of casks to be cleared away, for the purpose of getting to the lowest or ground tier, so diminishes the stability, as to render the ship frequently unsafe. When performed underway, therefore, it is always done under a low sail. It is the most tedious and disagreeable business connected with the fishery, the blubber having to be divided so small, that the casks can be filled, by putting it piece by piece through the bung-holes*: it is also disagreeable on account of the greasiness of the decks, and the instability of the ship, while it is going on; but not, as is generally

* A particular account of this process, called in fishing language *making-off*, is given in vol. ii. p. 304., of the "Account of the Arctic Regions."

supposed, because of any disagreeable effluvia arising from the blubber, since, before putrefaction, the blubber is not at all offensive; and even after putrescence, we are not annoyed by it, there being nothing whatever unpleasant in the smell of a whale-ship, until after its arrival in port, where the cargo is unstowed.

Being now near the northern ice, and seeing no whales to induce our stay, as soon as we finished "making-off," we began to retrace our way to the southward. We skirted the main western ice, trending with an unbroken edge to the southwest, towards a supposed large opening of the ice, indicated by a dark shade or reflection of water in the sky. After four or five hours sailing we obtained sight of the water, and perceiving a possibility of getting into it, though the communication was extremely narrow and complicated, we made the attempt, and, in consequence of the capability of the ship for extraordinary evolutions, succeeded, without striking a single piece of ice. The John, which closely followed us, was not so fortunate, as one part of the channel closed before she reached it, and detained her above an hour. The wind being from the SE., brought the loose ice rapidly down upon the main body, so that, as we expected, our retreat was immediately cut off. Though we were in a basin of water, completely surround-

ed by a wall of impenetrable ice, we had an extent of about fifteen miles towards the NW. of free navigation. Unfortunately the green colour of the sea changed as we entered the barrier of this lake, and in the interior we found it of a transparent blue,—a quality which affords so little food for the whale, that we were greatly discouraged in our expectations of success in this adventure.

During the next day we traced the limits of our mediglacial sea, and found it bounded on the north-west side by large heavy floes, and apparently interminable sheets of bay ice.

Two whales were seen in the afternoon, and pursued, though unsuccessfully, by the boats of both ships.

May 15*th*.—The sea, which had begun to freeze on the preceding evening, became universally covered with ice as far as the eye could reach; and its tenacity increased so rapidly, that, before midnight, both the ships stuck fast. A swell unfortunately penetrated through our seaward boundary, which, though so slight as to be scarcely perceptible to the eye, broke the floes around us into hundreds of pieces; and immediately the ice began generally to close, so that, on the 17th, the floes that were, three days before, ten or twelve miles asunder, came almost

into contact; and not a drop of water was to be seen from the mast-head. The new ice squeezed in some places a dozen thicknesses; and a considerable pressure came upon the ship.

No alteration took place all the following day, excepting the breaking out of a vein of water, here and there, at a distance from us. The ice immediately around was heavy, compact, and stationary. Many of the hummocks of the ice were at least twenty feet high; and the general thickness of the pieces alongside of the ship was from twenty to thirty feet. Some of these hummocks seemed to be of recent production, and a few, of no inconsiderable bulk, were thrown up within a mile of where the Baffin lay.—Latitude observed 79° 30′.

Though a Greenland voyage is perhaps one of the most arduous of all maritime adventures, the mind of the commander of a whale-ship being very rarely free from anxiety; yet, like all other occupations at sea, it affords occasional intervals of absolute leisure, such as when the attention of the captain to the progress of the ship is not requisite, or when, in consequence of calms, contrary winds, or other obstructions, the main designs of the voyage cannot be pursued. The immoveable state of the Baffin at this time, however irksome and productive of anxiety, was such as

to render any exertion for our relief or extrication perfectly useless: but this total suspension of ordinary duties, gave time and opportunity for scientific researches. My attention, when thus unoccupied by the management of the ship, had for some time been employed in making preparations for experiments on an original mode of developing magnetism in steel, the application of which might occasionally prove of considerable importance at sea. An account of some experiments on this subject, is already before the public*; but the application of the fundamental process to the construction of powerful and energetic magnets, was only made on the present voyage.

This fundamental process is the elicitation of magnetic energy by percussion. For this purpose, soft steel is employed, which is capable of retaining for some time the magnetic virtue developed in it, instead of iron, in which it is extremely evanescent, or hard steel in which it is with great difficulty produced. The first step in

* See "Description of a Magnetimeter," &c. Edinburgh Transactions, vol. ix. p. 243.; and "Experiments and Observations on the Development of Magnetical Properties in Steel and Iron by Percussion," Phil. Trans. for 1822.

the process is to hammer an iron or steel poker, or other rod of similar metal, of considerable size, while held in a vertical position, or, what is better, in the direction of the dipping-needle, by a few smart blows on the end; this will render the rod or poker sensibly magnetic. If a soft steel bar be now placed on the top of the poker, and hammered on the upper end, while both the poker and the bar are held vertically, or in the direction the dipping-needle assumes, it immediately acquires a considerable attractive force, the upper end becoming a south pole, and the lower end a north pole.

A cylindrical bar of soft steel, 6½ inches long, a quarter of an inch in diameter, and 592 grains in weight, thus treated, acquired, in one instance, a lifting power of about 40 grains by a single blow with a hammer weighing 12 ounces; and after ten blows (part of them given with a hammer a little larger), it lifted a nail weighing 188 grains! But a still more extraordinary effect was obtained by the use of steel-wire. A piece of a knitting-needle, three inches in length, and weighing 28 grains, which was proved to be without any magnetic virtue whatever before the experiment, on being repeatedly hammered when held vertically on the top of a kitchen poker, lifted a nail of 54 grains, or very nearly twice its own weight! This singular pro-

duction of magnetism, is in a great measure owing to the use of the rod of iron, the polarity of which, after hammering, greatly aids the development of magnetism in the steel; for the highest effect obtained by hammering the larger steel-bar, when held vertically upon stone, pewter, brass, &c. instead of iron, was only a lifting power of $6\frac{1}{2}$ grains *.

Such a high degree of magnetic energy being obtained by a process so simple, it suggested a ready means of making magnets, without the use of any magnetized substance whatever, and of

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* Dr Gilbert, who was the first person that investigated the phenomena of magnetism in a scientific way, found, among many other valuable discoveries, that iron, hammered in the magnetic meridian, acquired a slight degree of polarity, and that when a piece of iron was heated to incandescence, and drawn out in this direction, it became sufficiently magnetic for adjusting itself north and south, when carefully balanced afloat in water, by being thrust through a piece of cork. This is the only experiment with which I am acquainted that bears any analogy to the one that is detailed above; but this was not known to me at the time the discovery of this property was made. The effect, however, of Dr Gilbert's process, is inconsiderable, iron acquiring thereby little or no lifting power, with a directive force that is extremely small. By one blow with a small hammer, on a cold rod of soft steel held upon a poker, fifty times more magnetic virtue can be induced than the method of Dr Gilbert is capable of developing.

giving polarity to needles, so as to render them capable of answering the purpose of compasses, in an instant. This application of the process induces me to be more explicit on this incidental subject, because of its importance to seafaring persons. There are instances on record, of the compasses of ships being spoiled by lightning *:—

* In the Philosophical Transactions (vol. xi. p. 647.), is an account of a stroke of lightning received on a vessel in the parallel of Bermudas, which carried away the foremast, split some of the sails, and damaged the rigging: and, in addition to these extraordinary effects, it inverted the polarity of the compass, so that the north point became directed towards the south. This induced the navigators, who were not aware of the change, to steer back again, supposing that the wind had shifted; and it was not until they were accidentally set right by another ship, that they discovered the truth.

Another circumstance a good deal similar to this, also mentioned in the Philosophical Transactions, occurred in the year 1748–9, on the 9th of January. The ship Dover, on its way from New-York to London, was struck by lightning during a fierce storm, which was encountered in the latitude of 47° 30′ N. and longitude 22° 15′ W. On receiving the shock, the captain, and most of the crew, were for a while disabled in their limbs, or by blindness,—the main-mast was almost perforated,—the upper and lower decks and quick work were stove,—the cabins, bulk-heads, and one of the main lodging-knees of the beams were started or drove down: and, among several other singular circumstances, the magnetism of all the compasses (four in number) was destroyed, or the poles inverted.

This process would enable the navigator to restore sufficient polarity for the guidance of his ship, in a few seconds. And, in cases of vessels foundering at sea, or being destroyed by fire or lightning, in which the crew are compelled to take refuge in the boats at a moment's warning, and without having time to secure a compass (a case which has occurred hundreds of times), the same process might enable the distressed voyagers to give polarity to the blade of a penknife, or the limb of a pair of scissors, or even to an iron nail, which would probably be sufficient, when suspended by a thread, to guide them in their course through their perilous navigation.

Being desirous of applying the process to the construction of powerful artificial magnets, I prepared (with the assistance of the armourer on board) six bars of soft steel, and bars properly tempered, suitable for a large compound magnet. The soft steel bars were nearly eight inches long, half an inch broad, and a sixth of an inch thick. The bars for the compound magnet, seven in number, which were of the horse-shoe form, were each two feet long before they were curved, and eleven inches from the crown to the end, when finished, one inch broad, and three-eighths thick. These bars were combined by three pins, passing through the whole, and screwing into the last; and any

number of them could be united into one magnet, by means of a spare set of pins screwed throughout their length, and furnished with nuts. In addition to these bars, &c. I provided separate feeders or conductors of soft iron, suitable for connecting the poles of each of the bars of the compound magnet, and also another conductor, fitted to the whole when combined. With this apparatus, I proceeded to give the magnetic virtue as follows.

I took a rod of soft steel, which I considered better than a poker, and hammered it for a minute or two, while held vertically upon a large bar of soft iron in the same position. This gave considerable magnetism to the steel-rod. On the top of this, I then hammered each of the six bars of soft steel, until the accession of lifting power ceased. Then fixing two of them on a board, with their different poles opposite, and formed, by a feeder at each end, into a parallelogram, I rubbed these, after the manner of Canton*, by means of the other four bars, and found their magnetism greatly augmented. The other four bars were operated upon in pairs, in a similar way, those already strengthened being used for strengthening the others, and each pair being successively changed, until all the bars were found

* See Phil. Trans., vol. xlvii. p. 31.

to be magnetized to saturation. A pair of them now possessed a lifting power of two pounds and a half.

The next step was to touch the bars intended for the compound magnet, by means of these six bars now magnetized. For this purpose, the six bars were combined into two magnets, by tying three of them together, with similar poles in contact; these two were then placed, with opposite poles, in connection, and tied together at one end, but separated about the third of an inch at the other, so as to form one compound magnet, and a conductor was kept constantly applied to the open end of it, when not in use, to preserve the power from being lost. One of the bars of the horse-shoe magnet, with a conductor across the poles, was now placed on a board, in a groove cut out so as to hold it fast under the operation. The straight bar magnet was then placed erect on the middle of it, with the separated poles downward, and rubbed against the horse-shoe bar, from the middle to one of its poles, until the north pole of the one was in connection with the pole intended to become south of the other: from thence it was rubbed back again, with the south pole of the magnet in advance, as far as the other extremity, or that intended for the north pole of the horse-shoe bar. Two or three strokes of this kind being

made from end to end of the bar, on each side of it, the north and south poles of the magnet being always directed to the south and north poles of the bar respectively, the magnet was slipped sideways off, when at the pole of the bar, and the bar was found to have acquired such a magnetic power as to enable it to sustain a weight of several ounces, hung from the conductor. All the bars of the horse-shoe magnet were treated this way in succession. The first five bars of the magnet, being then combined by the screws, were employed in the same way as the soft steel magnet had been used, for increasing the power of the sixth and seventh bars, by which they were rendered capable of carrying above two pounds weight each. These were then substituted, in the combined magnet, for the fourth and fifth bars, while the latter underwent the touch of the other five in combination; and, in their turn, the second and third, and then the seventh and first, were subjected to a similar treatment. After these operations, which occupied forty-three minutes, the compound magnet, with all the seven bars in connection, lifted ten pounds. After a second series of the same kind of manipulations, five of the bars in combination, carried fifteen pounds; and, after a third series, eighteen pounds: but as, on trying a fifth series, little augmentation took place, the

process was discontinued. The whole of the operations, from beginning to end, occupied above four hours; but, as I generally rubbed each bar with twelve strokes on each side, instead of one or two, which I afterwards found sufficient; and, in other parts of the process, spent a great deal of time and labour which turned to no account, I doubt not but the whole might have been completed, beginning without the smallest perceptible magnetism, and ending with a lifting power of twenty or thirty pounds, in the space of two hours, or less *.

As steel does not receive, immediately on being touched, the full degree of magnetic energy of which it is susceptible, a conductor was applied to the magnet now formed; and it was laid aside, with the view of augmenting its power on a subsequent occasion.

* Canton, it is well known, produced magnets by means of a poker and tongs, with bars of soft steel. His process, being fully stated in the Philosophical Transactions, some of the above details would perhaps be anticipated by the reader; but they may not be uninteresting to those who are little acquainted with the subject, especially as the fundamental process is original, and much more ready and efficient, I apprehend, than that of Canton, one blow with a hammer being capable of developing as much magnetism as a quarter of an hour's labour with a poker and tongs.

Sunday, May 19th.—A slight relaxation of pressure took place on the Saturday evening, but a strong swell immediately intruding, the ice again collapsed, and remained close the whole of this day. The John, though, like us, immoveably fixed in the ice, increased her distance from us nearly two miles during the two preceding days.

Perhaps there is no situation of life in which an habitual reliance upon Providence, and a well founded dependence on the Divine protection and support, is of such sensible value, as it is found to be by those employed in seafaring occupations, and especially in the fishery for whales. These are exposed to a great variety of dangers, many of which they must voluntarily face,—and the success of their exertions depends on a variety of causes, over some of which they have no controul. The anxiety arising from both these causes is greatly repressed, and often altogether subdued, when, convinced of the infallibility and universality of Providence, by the internal power of religion, we are enabled to commit all our ways unto God, and to look for his blessing as essential to our safety, and as necessary for our success.

At half-past five o'clock, on Monday morning, I was awoke by the grinding of the ice against the side of the ship: on inquiring the cause, I was informed, that "the ice was on the move," having

already slacked in various directions around us. I instantly arose, and, conceiving there was a possibility of making a little progress towards our extrication, summoned "all hands to ship the rudder," which had been taken in for safety at the time the ice collapsed. This being performed, we took advantage of a favourable breeze, the influence of which, aided by warping, towing, and breaking the interposed bay-ice with boats, enabled us to advance, though very slowly, among the crowded and ponderous sheets of ice that opposed our escape. Some of these sheets of ice were 150 to 200 yards in medial breadth, and 20 to 50 feet in thickness. These being in many places in close contact, we had to separate them by the powers of our capstern and windlass, and other resources; but among others of equal magnitude, there was sometimes a channel, of a ship's breadth, that afforded us a readier, but more hazardous passage. It would be tedious to give the details of this day's operations; it may be sufficient to say, that after the most energetic labour, and careful management, had been continued for sixteen hours, almost without intermission, in which period the ship performed some of the most extraordinary evolutions I ever saw, and sailed through channels as intricate and contracted as it was possible for any vessel of equal size with the Baffin to

make its way, we succeeded, far beyond our expectations, in reaching a free and open navigation, without any accident or damage. The freedom now experienced, excited the most exhilarating sensations. In the morning a body of ice, scarcely to be compassed by the eye from the mast-head, of a heavy compact kind, imprisoned us; in the evening we were completely at liberty.

The John was left behind, the ice probably not having relaxed where she was beset, in the same degree as it did about the Baffin: before night, however, she was seen to be warping towards an opening to the westward, and making a sensible progress. This direction taken by the John, being opposite to that which we had pursued, soon separated us so far, with a close body of ice between us, that we unavoidably parted company.

CHAPTER III.

PROCEED TO THE SOUTHERN FISHING-STATIONS.—ENTER THE MAIN WESTERN ICE, AND PENETRATE WITHIN SIGHT OF THE EASTERN COAST OF *WEST* OR *LOST GREENLAND*.—CAPTURE TWO WHALES.

HAVING met with very little encouragement to persevere in this parallel for whales, I determined upon proceeding to the southern stations, extending from the 77th degree of latitude, downwards, where, within the last three or four years, the only good cargoes had been obtained. The period for the commencement of this fishery I calculated to be so near at hand, as not to render it prudent to remain longer in the now unproductive stations of the north. Before the year 1818, for at least a quarter of a century, the fishery generally was pursued between the parallels of 76° and 80°; and the 79th degree, at the distance of thirty or forty leagues from the coast of Spitzbergen, afforded to the most persevering fishers, an abundant harvest, for years together. After the season of 1814, however, the northern fishery became extremely precarious; the whales then be-

ing uncommonly scarce, the fishers began to explore the seas farther to the southward, but without proceeding into the depths of the ice, or remaining among it beyond the middle or end of the month of July; an idea prevailing, that it was not only useless, but extremely dangerous, to be entangled in the ice after this period. At the close of the season of 1817, I penetrated the ice in latitude 74°, about 100 miles towards the west, but without finding whales; and, the year following, two ships approached the east coast of Greenland, and met with encouraging success. In 1820, I obtained a full cargo, principally upon this station, in latitudes 74° down to 71°: and several other ships made successful fisheries amid the same ice, within sight of the "*West Land*." The year following, a vast compact body of field ice intercepted our approach to the coast of Greenland, farther than merely to get sight of it, so that the fishery in general failed; but a few ships falling into a more favourable opening, passed through this barrier, and obtained tolerable cargoes.

This "southern fishery," without the discovery of which, the Greenland trade would, no doubt, have been so unproductive that it must have been discontinued, is but yet in its infancy, and affords only such a degree of encouragement, as barely to

justify adventure. It is not yet ascertained, whether its stations on the eastern coast of Greenland be always accessible, or whether the recently observed separation of the body of ice on the face of it, be merely an accidental and occasional circumstance. Until within four or five years of the present, it was a prevailing opinion among the fishers, that this land was inaccessible, on account of the compact and dangerous qualities of the ice,—no ship having been known to approach within sight of it, but such as were beset, and involuntarily carried thither. And as the greatest destruction among the shipping, and the most calamitous events, respecting the sufferings of the crews and the loss of life, that have been ever known in the Greenland fishery, have occurred, when vessels have been forced by the ice, in which they were beset, upon this coast,—the whalers were always in the habit of contemplating an adventure on this station as extremely hazardous, and altogether unwarrantable. Now, however, these apprehensions have almost entirely subsided, and a considerable confidence prevails, both as to the coast being annually accessible, and as to its being regularly resorted to by the whales that have retreated from the more northern stations; but before it can be ascertained whether this confidence be well founded, several more years' experience will be requisite.

May 21.—Having a brisk breeze from the north, with fine weather, we proceeded under all sails along the western edge of the ice, where we had a free navigation and open sea, towards the south-west. At mid-day, observed in latitude 77° 42′; longitude by account 2° E.

The following morning, the wind falling, and veering to the westward, we tacked, to get in with the ice. At 10 A. M. we were on the skirts of an impervious pack, and observed a number of narwals: one of them, a very small specimen, we killed. It was of a much darker colour than the full grown animal, and much less variegated, and inferior in beauty. Though a male, it was without a horn; it had not yet protruded through the skin. At the same time, we picked up, and hoisted on board, a block of "fresh-water ice," weighing between two and three tons, and remarkable for its purity and transparency. A small lens of this ice, constructed with little care, readily ignited inflammable substances, by the concentration of the sun's rays. An observation, this day, gave the latitude 76° 24′; the next noon we were in 75° 43′ N.

Being now in the parallel where I proposed to renew the search for whales, we entered the ice, which was here skirted by detached streams, and proceeded beating to the north-west or west until

the evening, when a more compact, though still pervious, "pack" presented itself. The recesses of this I determined upon exploring. A fleet of nine or ten ships were assembled about its borders; but though a whale had been captured by one of them, and the colour of the sea, being of a turbid olive-green, gave every encouragement to expect more of the species to be near, none of them followed us, excepting a foreigner, when we entered this ice. The wind had freshened to a smart gale, and the ice proved heavy and "cross." We proceeded three or four hours towards the NW. and N., and then finding it more and more crowded, we drifted into a small opening, less encumbered with pieces than the rest, and hove to.

During the night we saw two whales; and the next day (May 24th), having made every effort to get to the westward, by towing the ship in light winds or calms, and sailing when we had a commanding breeze, we passed two very close and formidable barriers of ice, and entered a spacious opening of a very encouraging appearance. Here we saw two or three more whales; but they all escaped our pursuit.

May 25.—The wind was almost all round the compass, with some showers, and occasionally thick fog; but at length settling in the southern quarter, it blew tremendously hard, and the ice immediately began to close about us. The jib-boom

went away at the first squall, and the masts seemed to be in danger. Having cleared the wreck, and close-reefed the topsails, we attempted to find a corner in which the ship could be worked; but we were driven from one refuge to another, by the accumulation of ice setting in, until we scarcely had room to wear. The violence of the gale prevented the practicability of mooring the ship in the ordinary way; and it was now no longer possible to keep under-way in safety: fortunately at this juncture, I discovered a small sheet of bay-ice lying on the weather-side of a heavy patch. Against this we succeeded in drifting the ship, though there was little more than her length between two large and dangerous pieces of heavy ice that bounded its extremities. The bay-ice crushing under the pressure, prevented a violent shock. Instantly taking in the sails, we grappled to one of the large masses of ice, just at the moment when the last resistance of the bay-ice had given way, and the ship had begun to move astern. Ropes were now fastened, by ice-anchors *, to two or three of the heaviest pieces of ice, which preserved the ship during the gale in safety.

* The ice-anchor is a large iron hook, nearly of the shape of the letter *S*. One extremity of it is inserted in a hole drilled into the ice, and to the other the rope for mooring is attached.

A calm succeeded the gale, on the morning of Sunday the 26th of May. The ship being then in the middle of a heavy patch of ice, we warped into a more commodious situation, and again moored to a small sheet of ice, and had our usual devotional exercises. A large whale came up near us, and appeared three times in the same spot; but, being the Sabbath day, we did not pursue it.

During the three succeeding days the weather was generally foggy, with southerly or easterly winds, that brought the ice so much about us, that we could not keep the ship under-way. Several whales were seen, or heard blowing; all our exertions, however, in pursuing them, amid crowded ice and bewildering fog, were fruitless. The temperature of the air being near the freezing point, the fog was deposited on the rigging in a thick coating of transparent ice. At every movement in the rigging, this was dislodged in hard sharp masses of several pounds weight, which came down in such showers as to render it dangerous to look upward.

On the 30th we had a fresh gale at south-west, and a considerable fall of snow. At 4 A. M. it was announced to me that the ship was nearly beset. Personally suffering at the time under a severe cold and sore throat, with tormenting toothache, I was unable to "turn out." When I

arose from my bed about noon, the ship was firmly beset in the midst of a pack, consisting of a wilderness of heavy, rugged drift-ice. Innumerable hummocky peaks were on every hand, some of them reared to the height of 30 or 40 feet, and exhibiting, in a striking manner, the prodigious effects of the occasional pressure. The next day the wind chopped round to the northward, and blew a hard gale. The effect was soon apparent, the ice beginning to slack and separate in all directions.

On the 1st of June, in the morning, the ice had sufficiently relaxed its pressure to enable us to move. A vein of water stretching far to the eastward, having broken out a little to leeward, we bored through the intervening ice into it, without any canvas set, excepting the fore-sail occasionally, and prevented the shocks the ship under a fresh gale would otherwise have been exposed to, by dragging a small piece of ice, of a few fathoms diameter, astern. After a few leagues of intricate sailing towards the north-east had been accomplished, we fell into a clear sea, several miles across, bounded on the SW, W, NW, and N. by fields and floes. On stretching to the northward, we came to the edge of a heavy floe, 8 or 10 miles in diameter, near which three or four large whales were seen. These all escaped

our harpoons; but another, the last that appeared during the day, was struck. It remained about forty minutes under water, without once coming to the surface, and then rising in the midst of the boats, was very soon dispatched. The flensing was immediately undertaken, and accomplished in about four hours. One ship was in sight, the Altona of Altone, which also made a capture.

Sunday, June 2.—Several whales were seen during the afternoon and evening; and the Altona was observed to have all her boats in chace. The harpooners were so tantalized by seeing whales in considerable numbers, which they were not allowed to pursue, that I was obliged to order them from the mast-head, and to run the ship out of the way.

As soon as the Sabbath was concluded, we approached the edge of a large floe, where the whales had been seen, and soon had sufficient encouragement to send all the boats to the chace. In a bight formed by the angles of two or three floes, an extraordinary number of "fish" were seen; they were in shoals of half a dozen or more together, sporting occasionally, and enlivening, by their frequent appearance, this otherwise barren region of solemn stillness and desolation. A thick fog set in soon after the boats were dispatched, and hid several of them from our observation for two or three

hours. The atmosphere then partially cleared, and one of the boats was discovered with a jack flying, the signal of being "fast." The situation, however, was a very unpromising one, the ice in that particular place being rugged, and full of small holes, which affording the whales convenient apertures for "blowing;" and, at the same time, sheltering them from our observation and attacks, rendered the chance of capture very dubious. This being the case, I recalled three boats out of seven, and sent them in pursuit of other whales, many of which were yet blowing around us. One of these boats soon afterwards rowed into the midst of a shoal of seven or eight of the largest size. They were lying at the surface, huddled together remarkably close; but the weather being very still and calm, they all took the alarm, while the amazed harpooner was standing aiming his weapon first at one and then at another, until the whole shoal made their escape. They were so near, that the water thrown up by their tails flew in showers over the boat; while the sea for a hundred yards round, was filled with eddies and little whirlpools.

I now ran the ship into a deep "bight" of the ice, where the "fast-boat" was lying, for the purpose of directing the operations of the harpooners, and looking out for the "fast-fish." Notwith-

standing all my endeavours, I could not discover it; nor were the researches of parties of men that were sent over the ice in various directions, more successful. After it had dragged above a mile and a-half of line out of the boat from whence it was struck, and struggled for its liberty for almost twelve hours, the harpoon at length gave way, and the fish escaped us; but whether living or dead, we could not tell.

Attempting now to leave the contracted bay which we had entered, in pursuit of this whale, a breeze sprung up from the south-east, and set the ice so rapidly upon us, that before we could beat out, two floes came in contact and cut off our retreat. As the floes continued to approximate with a velocity of upwards of a mile an hour, it was not without difficulty that we reached a small clear pool of water, about two furlongs in diameter, without receiving a squeeze from the ice. Here we moored the ship to a sheet of bay-ice, connected with one of the floes, which appeared to be the least dangerous part of the opening, in case of a second crush. We had not been long at rest, before two whales arose near us, and one of them received a harpoon. It only "ran out" four lines (480 fathoms), and then, very fortunately for us, came up in the middle of the little lake wherein the boats were dispersed: three more harpoons

were presently struck, and within an hour and a half after the first attack, it yielded its life to our lances. It proved a good prize; the whalebone measured 10 feet 3 inches, and the animal was calculated to yield 14 or 15 tuns of oil.

The day following (June 4th), two floes adjoining us having separated, permitted us to retire farther towards the west, into a more commodious opening, where we were confined by a boundary of impenetrable ice until the 7th.

During our detention here we saw a few whales; but, towards the conclusion, not one had appeared for eight-and-forty hours. A great many narwals were often sporting about us, sometimes in herds or shoals of 15 or 20 together. Several of the shoals consisted entirely of male animals, each having a long horn (or tooth) projecting from the forehead. They were extremely playful, frequently elevating their horns, and crossing them with each other, as in fencing. In the sporting of these animals, they frequently emitted a very unusual sound, resembling the guggling of water in the throat, which it probably was, as it only occurred when they reared their horns, with the front part of the head and mouth, out of the water. Several of them followed the ship, and seemed to be attracted by a principle of curiosity, at the sight of so unusual a body. The water being perfectly

transparent, they could be seen descending to the keel, and playing about the rudder for a considerable time, and then proceeding to a little distance, before they ascended to breathe. They "blew" with much force: an act of expiration always, I observed, succeeded their first appearance at the surface; and they invariably descended with the lungs inflated. Their breathing resembles a puff of steam or air; a pause of perhaps two or three seconds occurs between each act of respiration, and after it has been continued for eight or ten times, the animal generally descends: but sometimes it will remain for several minutes afterwards at the surface, without either breathing perceptibly or moving.

An observation for the latitude, on the 5th of June, gave 74° 18′. From this it appeared, that we had drifted with the ice nearly 100 miles to the southward, besides a distance probably nearly as great to the westward, in an interval of only twelve days. Our course during this time had been rather to the northward than otherwise.

On the 6th, in the morning, all the rigging of the ship was thickly covered with a double fringe of snowy crystals, consisting of the particles of fog that had been deposited during the night on the opposite sides of the ropes, as they were successively presented to the wind, on the ship being repeat-

edly tacked. These fringes were beautifully white, and the points or spines of which the fringes were composed, were tapered and radiated. Hence every rope or other substance, containing on its surface small fibres, suitable for the attachment of the frozen particles, became the centre or axis of a cylindrical icy zeolite. The angles the rays formed with each other, in consequence of the different roots from which they sprung, were various, and generally very acute. No doubt, the prevailing angle of those crystals that arose from the same root was 60°; but as the spines had various independent attachments, they became more nearly parallel. Each fringe was formed of a chain of beautiful rosettes of spines; each spine in the rosette tending to its attachment very near the common centre. Every spine consisted of a fasciculus of needles, so arranged as to form a tapering ray. The longest spines were about three-fourths of an inch. The needles strongly magnified, appeared like chains composed of drops of richly cut crystal.

The fog which produced this beautiful appearance, came in showers of varying density. The particles were so small as to be quite invisible to the eye; and as no dampness was perceptible, the particles must have been extremely minute. The temperature of the air during this deposition, was

26° to 28°; the barometer was at 29.60 inches; the wind light and variable. On another occasion, when similar fringes were produced, showers of snow, consisting of prisms or needles, apparently of the same description as those formed on the rigging, were mixed or alternated with the fog. And previous to this fog, we had constant showers of the same kind of snow, which had a similar effect on the atmosphere, giving rise to the same kind of clouds, as resulted from the fog productive of fringes.

Hence, we may reasonably infer, that the formation of prismatic or needle-formed snow, is a progressive process, and similar to that by which fringes on the rigging of a ship are produced; and that snow-crystals in general (as is intimated in the first volume of the Account of the Arctic Regions) are not produced by a sudden crystallization, but are derived from a progressive and continued attraction of aqueous particles in the air, capable, under the influence of some law not yet explained, of producing an endless variety of regular figures. It is probable, that the first two or three particles of vapour that are consolidated in contact, become the nucleus of a crystal, by which a regular arrangement of particles, as to the angles they form, are attracted; and that the balancing or equalizing of these attractions, by the

reception of an equal number of particles in six different positions, may determine the regularity of the figure produced. Thus, I apprehend, when a nucleus of many particles receives an accession to one of its sides or rays, an attractive energy is communicated to all the other five sides or rays, which remains with undiminished energy, until some particle comes within their influence, and that it is not until each has received its share, that the attractive force is neutralized. Some law of this kind, I should imagine, *must* prevail, otherwise the formation of regular crystals would be absolutely inexplicable; and much more so the production of crystals, of which the greatest proportion of the snow that falls in severe frosts in the Arctic Regions consists, wherein every ray, angle, and side, are equal and similar.

It would appear that the general form of the component parts of snowy fringes and depositions of hoar-frost, as well as the general character of the crystals of snow, has some relation to the temperature of the atmosphere at the time. With regard to snow-crystals, I have often observed, that the prismatic, or needle form, is the most common, when the temperature is near the freezing point, having rarely seen it when the thermometer was below 28° or 27°; while other delicate crystals, of certain form and magnitude, only oc-

cur at low temperatures. In like manner, all the varieties I have observed in snowy deposits on the rigging, were produced under different temperatures. At 10°, the form of the crystal of the fringe was a beautiful feather, possessing a perfect arrangement of the different parts, corresponding with the shaft, vane, and rachis *. At a higher temperature, probably 22° or 23°, the crystal consisted of a combination of angular cups, inserted into one another in a herbaceous form, not unlike a species of erica or heath. At 26° or 28°, it consisted of spines, or rosettes of spines, as above: and at the temperature of 30° or 32°, the deposition was generally uncrystallized, forming a glassy coating of transparent ice.

On the 7th of June, such finely marked ice-blinks appeared in the atmosphere, in connection with the horizon, as to present a perfect map of all the ice and openings of water for twenty or thirty miles round. The reflection was so strong and definite, that I could readily determine the figure and probable extent of all the fields and floes within this limit, and could distinguish packed or open ice, by its duller and less yellow image; while every vein and lake of water, producing its marked reflection by a deep blue, or

* Vol. i. p. 488, &c. "Account of the Arctic Regions."

bluish-black patch, amid the ice-blinks, enabled me to ascertain where the most water lay, and the nature of the obstacles that intervened. By this means only, I discovered a large opening immediately to the north-westward of the lake we had so long navigated, with a considerable expanse in the same direction, at a greater distance, bounded by sheets of ice that appeared to be of prodigious magnitude. This induced me to examine the ice very closely in this quarter, when, in the very spot marked by the blink as being the narrowest, the ice was found to be in the act of opening, so as to permit our passing through towards the north-west. At the extremity of the first opening, or lake, there was a compact barrier of floes, wherein, however, after a few hours detention, we discovered a narrow dubious channel, that eventually conducted us into the expanse of water pointed out by reflection in the atmosphere *.

This opening we crossed towards the NW.,—a distance of nine or ten miles. Then, meeting with ice, amid which we could not discover a passage, a thick fog having set in, we hove to for the night. Our advance towards the west, we could perceive, was bounded by a magnificent field, con-

* The phenomenon of the *ice-blink* is more fully described in vol. i. p. 299. & p. 383. of the Account of the Arctic Regions.

sisting of a single mass of the heaviest sheet-ice, nearly twenty miles in diameter. By this field, the clear sea we now navigated had been produced, under the influence of south-westerly winds, which had drifted away the smaller and lighter ice from its eastern edge. In this way, wherever the ice has room to move, considerable spaces of water, free from any incumbrance, are almost invariably produced on the lee-side of the more ponderous fields and floes. The effect of the larger fields is sometimes such, as to occasion open lakes which the eye cannot compass from a ship's mast-head.

The night of the 7th–8th was stormy, with snow or fog; but, at four in the afternoon, the wind having subsided, the sky became perfectly clear. Land was then discovered, extending from N by E (by the compass) to NW.; the nearest part supposed to be at the distance of fifty miles. This was the eastern coast of GREENLAND, being an extension, or continuation towards the north, of that coast on which the ancient Icelandic colonies were planted in the tenth century. I looked on it with intense interest, and flattered myself with the hope of being able to land upon some of its picturesque crags, where European foot had never trod, before the season for the fishery should come to a close. As no ship had ever before penetra-

ted (I had reason to believe) within sight of this coast, at so early a period of the summer, I was encouraged to expect that my wishes would not be difficult to accomplish: and, as the main design of my voyage was fortunately compatible with researches about this unknown region, I determined immediately to penetrate, as far as possible, towards the shore.

Our latitude being 74° 6′, I took the southernmost land in sight to be the Hold-With-Hope of Hudson; and the most northerly, having the appearance of an island, to be the eastern headland of Gale Hamkes' Bay, discovered, according to the charts, in 1654.

On attempting to proceed to the NW. we were soon interrupted by an impervious barrier of fields and floes closely wedged together. One opening only was visible in this direction; but it was not accessible. We were obliged, therefore, to wait until some alteration in the ice should take place, and open us a passage. The evening being calm, I took a boat, for the purpose of examining the points of junction of the floes with each other, that I might mark the first relaxation of pressure, which often is found to occur in calms, and take advantage of it, for accomplishing my design of approaching the land. No relaxation, however, sufficient for our purpose, was observed.

In this investigation, I was much struck with the resemblance to works of art, of some of the numerous ponderous blocks of ice past which we rowed. One mass resembled a colossal human figure, reclining in the position of the Theseus of the Elgin collection. The profile of the head was really striking; the eye, the forehead, and the mouth, surmounted by mustaches, were distinctly marked. Such resemblances in the forms assumed by the drift-ice and hummocks, which occur in an infinite diversity in the Arctic Seas, are not uncommon. In some instances, possibly, the aid of a fertile imagination may be requisite to put a shapeless lump of ice into form; but, in others, the resemblances are so striking and characteristic, that the eye of the most incurious can scarcely fail to be impressed by them. In the course of my last voyage, I sketched about twenty specimens of this kind, the whole of which had something interesting or extraordinary in their construction. Among these, were two masses, presenting most excellent figures of the polar bear, one of them raised upon a pedestal of about thirty feet in height,—several antique tables,—a table sorrounded by a fringe of large stalactites of crystalline ice,—resemblances of the heads of lions, and other animals,—together with two or three busts, and other pieces of very tolerable

statuary,—and also a sort of portico, with doric columns, consisting of capitals, with ovolo, astragal, and other mouldings, with a portion of the shaft, supported on a base of ice rendered invisible by its submersion in the sea.

These extraordinary resemblances occur the most frequently in the drift-ice occupying the skirts of the main body of the polar-ice, and particularly in those masses, on which prodigious blocks or hummocks, the original effect of pressure, are reared on separate bases. From the detrition of the sea-water, during high winds and considerable swells, these shapeless masses are often worn into such interesting and striking forms, as to force themselves on the attention. The most common form of artificial appearance is the table. In this the stalk is often perfectly circular and vertical, and the top exactly on a level. The mode of its formation is not difficult to explain. The action of the sea, when the surface is ruffled, but not turbulent, washes away the ice above the floating level, and undermines the top. The occasional revolutions of the ice, to which most of the smaller pieces are liable, exposes every part progressively to the detrition of the waves, and thus produces a stem of a cylindrical form. In a manner somewhat similar, I apprehend, the doric columns above noticed were produced. In this

block of ice two perforations had been produced, for which, either the unequal action of the waves upon it, or an unequal breadth or degree of hardness of the ice, might account. When the pillars on each side of these perforations had become cylindrical, like the stem of the table above described, to which there is always a tendency in such masses as revolve,—suppose a piece of the roof or entablature to break off, the base, relieved of so much weight, would necessarily rise a little in the water, and the pillars would be lifted up along with it. A continuation of the detrition of the wind-lipper, or smaller waves (the piece of ice being now supposed to be in a situation sheltered from the main swells of the ocean), would, no doubt, reduce the columns below the level of the former action, and thus produce a moulding: a repetition of this process, after a second mass from the top had been accidentally detached (a circumstance that is perpetually taking place), would account for the construction of a second moulding, and so on, until the regular columns that I have actually observed, not in one piece of ice only, but in three different masses, were completed. Thus, the production of architectural resemblances, of a very artificial kind, may, I think, be satisfactorily explained; but the development of many of the other figures that I have seen, can be accounted

for only on the principle, that, in a variety of accidental forms, which, with regard to the polar ice, is almost infinite, such similitudes of animals and of the works of art must occur. It should be observed, however, that very few of the curious figures in ice will maintain their character, when examined in all positions; it is, perhaps, only in one aspect that the appearance is at all interesting. The outline is the principal thing necessary for determining the resemblance, since the beautiful whiteness and reflection of light are generally such, as to conceal the defects of the surface, by preventing the inequalities from being detected by the eye *.

No alteration took place in the situation of the ice on the 9th June. The weather was beauti-

* Some circumstances now stated, as well as other remarks and descriptions that are given in this volume, will be found to be mentioned in Captain Manby's "Journal of a Voyage to Greenland, in the year 1821." Both in justice to Captain Manby and myself, I therefore think it proper to remark, that such circumstances either occurred within the observation of both of us, or that such remarks arose out of my numerous and interesting conversations with this intelligent friend, during the voyage in which he accompanied me to the whale-fishery; and, consequently, that their original suggestion, if not simultaneous or common to both, could scarcely be claimed by either.

fully fine. The sky being cloudless, the sun shone with a degree of splendour and warmth that was most exhilarating; yet the thermometer in the shade never rose higher than 36°.

CHAPTER IV.

SURVEY OF THE EAST COAST OF GREENLAND COMMENCED.—SEVERAL INLETS AND SOME ISLANDS DISCOVERED, AND NAMED.—GREAT ERRORS IN THE CHARTS DETECTED.—BEAR KILLED.—CURIOUS ATMOSPHERIC REFRACTIONS.

Monday, June 10th.—DURING this day we had the wind in light or moderate breezes all round the compass. As we were so completely inclosed, in a recess of the floes, diminished to a mere pool by the closing of the bounding ice, that it was impossible to escape, or proceed to any distance, I employed myself in making observations on the "local-attraction" of the Baffin.

Several plans have been suggested for the solution of this important proposition; but most of them, if not all, are attended with troublesome calculations, or other difficulties. It appeared to me, however, that a situation might be found at the mast-head of a ship, free from local attraction, where the *deviation* of the steering or binnacle compass might be at once ascertained by comparative observations, made independent of external objects. The crow's-nest of the Baffin,

which is fixed on the very summit of the main-topgallant-mast, is just such a situation. No iron whatever was employed in its construction, and not any of this metal was to be found within fifteen feet of it; the iron that then occurs about the mast, being of little bulk, and in a position directly below the crow's-nest, was considered to be incapable of producing any sensible influence on a compass placed directly above it. Hence, it was presumed, that, in a compass so situated, there could be no deviation. This being the case, all that was necessary for determining the Baffin's deviation, on any one course, was merely to compare the direction of the ship's head by the mast-head compass, with that pointed out by the binnacle compass. The difference of the two was the deviation on that course. But for determining the deviation on each point, I proceeded as follows:—The binnacle-compass was removed, and an azimuth-compass substituted in its place: an azimuth-compass on Captain Kater's principle, furnished to me by the Board of Longitude, was also substituted for the little compass I usually carried in a box fixed on the topgallant-mast-head. With these instruments I could make the observations more accurately than with the ordinary compasses. Having previously ascertained that the main-mast and fore-mast of the Baffin were upright, or

at least parallel, I now observed, by the compass in the crow's-nest, the course on which the ship lay, merely by taking the bearing of the fore-top-gallant-mast, and noted at the same time the exact course by the binnacle-compass, as read off by the mate and surgeon. Then, putting the ship successively on every point, as far round as the wind would permit, I continued to observe the bearings of the fore-topgallant-mast, and to compare them with the course by the binnacle-compass. These observations afforded data for the deviation on twenty points out of thirty-two. Fortunately the wind shifted during the operations, so that with the aid of a few observations taken " in stays," the remaining twelve points were likewise determined. On many courses two, three, or more observations were taken. The mean results of the whole are contained in the following Table

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* In this Table, the signs + and — are used in the second column, to indicate that the errors (or corrections) are to be added to, or subtracted from, the westerly variation; the sum or difference obtained on any course being the correction for reducing the magnetic bearings taken on that course to the True North and South. In the third column, the letters N, S, E, and W, are used to point out the direction (whether towards the north, or south, or east, or west) in which the correction of " approximate errors" is to be applied to the course by the binnacle-compass, for giving the true course.

Course by Binnacle Compass.	Deviation.		Course by Binnacle Compass.	Deviation.	
	Observed.	Approximate.		Observed.	Approximate.
N.	— 6°	7½ E.	S.	+ 16°	16½ E.
N b E.	8	8	S b W.	16	17¼
NNE.	9½	8¼	SSW.	17	17½ S.
NE b N.	9½	8	SW b S.	17	17¼
NE.	8	7¾	SW.	16½	16¾
NE b E.	7	7	SW b W.	15	15¾
ENE.	5¾	6	WSW.	13	14½
E b N.	...	4¼	W b S.	11	12¾
E.	2	2 S.	W.	...	10½
E b S.	0	¾ E.	W b N.	7	7¾
ESE.	+ 3	4	WNW.	...	4¾
SE b E.	7½	7	NW b W.	2¾	1¾
SE.	11	10	NW.	0	1 N.
SE b S.	12	12½	NW b N.	— 2	3¼
SSE.	14	14¼	NNW.	...	5
S b E.	15½	15½	N b W	4½	6½

This Table of deviations is rather an uncommon one; the points of change are E. ⅔ S., and NW. ⅓ W.; or S. 82° E. and N. 49° W. The maximum error, additive to the variation, occurs on a SSW. course, and amounts to 17½ degrees; while the maximum subtractive error, which occurs on a NNE. course, is only 8¼ degrees, though, in most ships, these two denominations are pretty nearly equal *.

* I attribute the peculiarities, as well as extraordinary quantity, of the deviation in the Baffin, to the influence of an

To prove the accuracy of the bearings taken at the mast-head, and to satisfy myself that this position was really free from local attraction in every direction of the ship's head, I took a set of azimuths, while the ship was on different tacks; and I likewise observed the constant bearing of the sun when the ship was in stays, and moving progressively through twelve points of the compass,—the whole of which, allowing for the sun's motion in the interval, agreed within the limit of the errors of observation. For instance,

Ship on the starboard tack, at 6h 51′ P. M. - -		⊙'s azimuth, 314°
Larboard tack, 6h 53′ P. M.	314° 30′	
Correction for 2′ of time,	—0 30	— ——— 314
Starboard tack, 7h 1′ P. M.	316° 15′	
Correction for 8′ of time,	2 0	— ——— 314¼
——— — 7h 9′,	316° 30′	
Correction for 9′ of time,	2 15	— ——— 314¼
When the ship was tacking, and on various courses, 7h 9′, - - -	318° 0′	
Correction for 16′ of time, (about) - - -	4 0	— ——— 314

iron tiller and iron rudder works, which, owing to the position of the wheel (being near the taffrail), are rather too close to the binnacle.

The correspondence of these results is, I conceive, decisive as to the accuracy of compass-bearings, taken from the Baffin's main-topgallant-mast-head.

The Baffin's deviation being so very considerable, the observations now obtained were of the utmost consequence to us. A simple example will illustrate this. Suppose the Baffin to sail with a fair wind 100 leagues on a SSW. course, per compass, [the variation being 42° W.] and then back again 100 leagues on a NNE. course by the compass, it is evident, that if there were no deviation, or other cause of error, she would return exactly to the point from whence she started; but in consequence of the deviation only, her actual position would prove to be 123 miles to the eastward, and 55 to the northward of the place from whence she set out; or, sailing 200 leagues on a SSW. course per compass, (a course often pursued on the homeward passage from Greenland), the error in the reckoning would be 86.4 miles too far southerly, and 160.8 miles too far westerly! That is, the ship would prove to be 189 miles to the eastward and northward (or in the direction of E. 27° N. true) of her position, as calculated without the application of the correction for deviation. Such an error existing, without its being known or compensated, it is evident, might be productive of the most fatal consequences.

The process I employed for determining the Baffin's deviation, I might add, could be easily practised in any ship for the same purpose, when lying in a river, bay, wet-dock, or other situation where the water was smooth. All that would be requisite for supplying the want of a crow's-nest, would be to rig a temporary stage of studding-sail booms or planks, on the middle of the main-topgallant-mast, where there would be no fear of deviation; and on this stage, observations for determining, by comparison, the error of the binnacle-compass, when the ship's head was in different positions, might be easily made. When, however, a very distant well-defined object can be seen from the place occupied by the binnacle-compass, perhaps a simple set of observations on its bearings, with the ship's head on every point of the compass, is the most easy of all other methods for obtaining the deviation. But there are few cases in which the bearings of such an object could be accurately determined by the compass in the binnacle, because of the difficulty and indeed impossibility of employing the sight-vanes while the compass is under cover, and because of the liability there is of the deviation being changed, by merely removing the compass out of the binnacle, though it be placed within a foot or two of its proper position.

In connection with the observations for determining the Baffin's deviation, I took the necessary altitudes and azimuths of the sun for the variation of the compass, which, on a mean of two sets, gave 42° 8′ W. The latitude, at the same time, was 73° 54′, and the longitude, by the chronometer (its rate corrected by subsequent observations), was 16° 39′ W. I also took a set of bearings of the most remarkable points, mountains, and inlets of the coast of Greenland, a considerable extent of which was in sight, for the purpose of conducting a survey of this unknown country, should sufficient opportunities during the voyage occur.

The weather during this busy day was most favourable for my various observations and operations. In the evening it was calm, with a brilliant sun, and very curious exhibitions of the phenomena of unequal refraction. Hummocks of ice assumed the forms of castles, obelisks, and spires; and the land presented extraordinary features. In some places, the distant ice was so extremely irregular, and appeared so full of pinnacles, that it resembled a forest of naked trees, (Plate II. Fig. 1.*): in others it had the cha-

* In the plates illustrative of the optical effects of unequal refraction, it should be observed, that many anachro-

Fig. 1.- June 10th

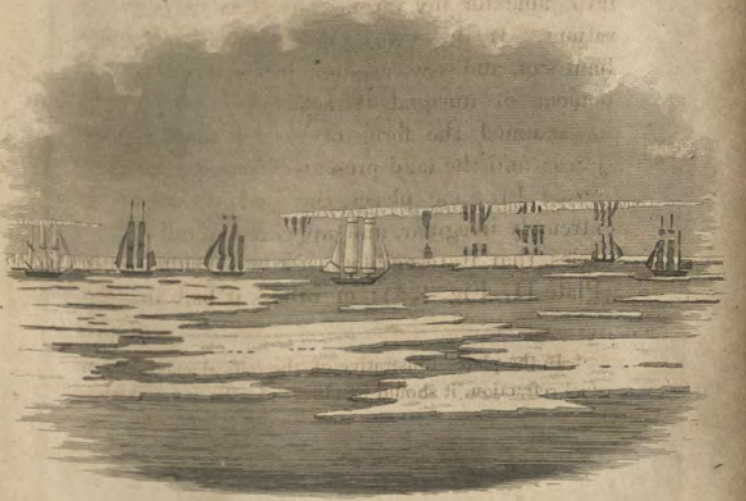

Fig. 2.- June 19th

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W.H.Lizars sculp.r

racter of an extensive city, crowded with churches, castles, and public edifices. The land was equally under the influence of this singular mirage. Huge masses of rocks and summits of mountains were reared to an enormous elevation, distorted into singular shapes, and often seemed to be detached from the rest of the land, and freely suspended in the air. The horizon, bounded by ice, which ought to have been pretty regular and uniform, was sometimes undulated and broken.

Two ships, (the first that had been seen for many days), came within sight; but they could not join company, on account of the close contact of the different sheets of ice around us.

Early in the morning of the 11th of June, during a stark calm, the pressure on the floes relaxed. As soon as there was room for the ship, we began to track towards the north-west; and ha-

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nisms have been introduced, for the purpose of giving as many illustrations as possible of these interesting phenomena. All the appearances represented in each figure (with one or two exceptions) occurred on the day to which such figure is referred, and generally within a few hours, and sometimes minutes, of the same period; but they were seldom, if ever, simultaneous: they also occurred while the Baffin was pretty nearly in the same situation, but not within the small apparent limits they occupy in the plate.

ving reached the edge of the large field mentioned on the 7th, we landed all the crew upon it, and dragged the ship by a rope two or three miles, until, on the springing up of a breeze, we had room to take sail. At 7 A. M. we reached a large opening, which communicated, by various narrow and intricate channels, with other openings towards the north-west. These we traced to their utmost limit, until the ice became a solid impervious body, with scarcely a pool of water to be seen among it, from the mast-head. Here, therefore, our approach towards the land was stopped.

In the evening, I observed in longitude, by chronometer 17° 39′ W.; the latitude was 73° 43′. This position, compared with the observations of the preceding day, gave me a base line, from the extremes of which, I obtained intersecting bearings of the land, that enabled me to lay down in a chart the most prominent parts of the coast.

Wednesday, June 12th.—We had the wind this day from various quarters, but chiefly from the south-eastward. For nearly four days, or ninety-six hours, previous to this, the weather had been clear, and the sky almost constantly cloudless; so that the sun, in making nearly four revolutions in the heavens, was never for a moment obscured. The reflection of the sun's rays from the ice, rendered the light excessively in-

tense, and often painful and injurious to the eyes.

The land being now only ten or fifteen leagues from us, and fortunately less disfigured than usual, by refraction, I obtained a good sketch of its appearance, and another set of observations on its bearings. As no advance could possibly be made towards the west, nor indeed in any direction, our retreat having been cut off by the closing of the ice in our rear, these occupations served to amuse my mind, and fill up the hours of tedious detention and inactivity.

In the night we saw a whale, the first that had appeared near us for a-week. It only showed itself once, and then passed out of sight.

The two following days we continued in the same basin of water, cruising from end to end, and penetrating almost every crack towards the north-west, that would admit the ship a passage; but no progress, I found, could be made, in the destination I had assumed, while the ice continued in the compact state it was then in. Our nearest approach to the land was within about ten leagues; beyond that point it was impossible to advance. The ice between us and the coast was a heavy body of fields and floes; and these were so compactly congregated, that there was seldom the smallest speck of water to be seen among them. In all direc-

tions, indeed, the ice was extremely crowded and closely connected, so that we were unable either to advance or to recede. Small changes, however, occasionally took place in the ice immediately around us; the floes between which we lay, frequently coming into contact with considerable violence, and others beyond them at the same time separating. These changes obliged us to be continually on the alert, to avoid the concussions of the ice, which would probably have been destructive to the ship, and fatal to our lives. The ice around was not of an ordinary kind; but was the most ponderous and rugged that I almost ever saw. The general elevation, and apparently interminable extent of the floes, with the immense load of hummocks on their edges, indicative of the tremendous crushes that had recently occurred, gave a grand but rather awful character to the scenery. The hummocks on the edges of the floes consisted of ridges, blocks, and hillocks of ice, twenty, thirty, or even forty feet in elevation; and in the interior of many sheets of ice, there were great numbers of hummocks of twenty feet, and upwards. It was impossible to contemplate these vast elevations of ice, without reflecting on the enormous power which must have been exerted to rear ridges of many thousands of tons weight; and to break and crumble the edges of fields

twenty or thirty feet in thickness, of solid ice, to afford materials for such ponderous superstructures.

The dangerous and impervious qualities of the ice, in this quarter, with the discouraging circumstance of the scarcity of whales, amounting almost to a total want of them, rendered it a matter of prudence to attempt a speedy change of our position, into a more commodious and promising station. And this was of the more consequence, since the drift of the ice towards the south-west, which, for three weeks preceding our entrance amid the land floes, had averaged seven or eight miles a-day, was found to be suspended; no change having now taken place in our latitude for two or three days. Hence, there appearing to be some stoppage to the drift of the ice, it was to be apprehended, that, instead of its becoming more open, the pressure of the ice descending from the north upon it, would occasion, if possible, an increased accumulation.

Fortunately the time expended in fruitless exertions to reach the land was not lost. The weather being almost constantly clear and fine, the coast was continually visible, through an extent of ninety miles; and although we were far from some of this coast, yet its great elevation and boldness, rendering it visible, at least at twice the distance we were from it, I had the opportunity

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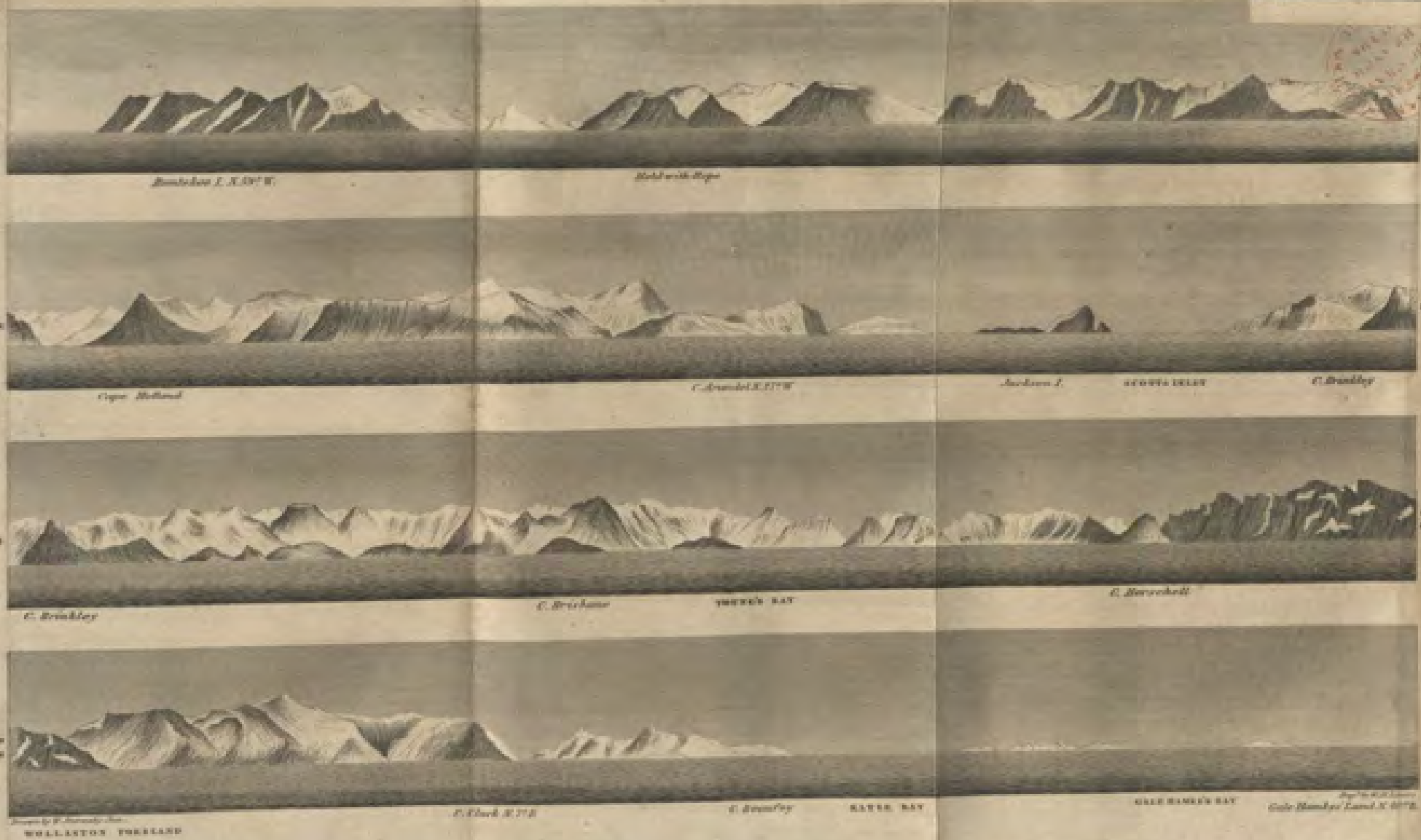
of obtaining a very tolerable survey of all the prominent parts. In carrying on this work, I had already had five or six stations, determined astronomically, and had employed upwards of fifty angles or bearings.

The general trending of this coast, extending from Gale Hamkes' Bay, in latitude 75°, to Bontekoe Island and Hold-with-Hope, in 73° 30′, is SSW., true. It is almost wholly mountainous, rugged, and barren. Its general character is not unlike that of Spitzbergen; but the quantity of snow upon it seems to be generally less. Its ordinary height I estimated at 3000 feet; an elevation which it probably attains within a mile or two of the sea.

Of the land now surveyed, only three or four places are noticed in the charts; these are *Gale Hamkes' Bay* and *Land* at one extremity, and *Bontekoe Island* and *Hudson's Hold-with-Hope* at the other. There is also *Broer Ruy's Land;* but I apprehended it is synonymous with Hold-with-Hope. These places can only be recognised from the latitude in which they are laid down; the longitudes being extremely wide of the truth, and their relative positions inaccurate. From Gale Hamkes' Bay to Bontekoe Island, there are no capes nor inlets laid down; whereas the coast presents many striking headlands and deep in-



CONTINUOUS VIEW OF THE COAST OF GREENLAND FROM BONTEKOE ISLAND TO GALE HAMKES' LAND.

dentations. Hence it became a matter of convenience to give names to the most remarkable promontories, inlets, and islands; and in this, I considered myself justified, by the example of former navigators; particularly as my survey was the first that had ever been attempted of this coast, and many of my researches appeared to be original discoveries. The names now applied I derived partly from peculiar characters observed in the land; but more generally from the remembrance of respected friends, to whom I was wishful to pay a compliment that might possibly survive the lapse of ages.

The northernmost land seen, as I have before observed, coincided in latitude with the position usually given to the Land of Gale Hamkes, said to have been discovered in the year 1654, by a Dutch whale-fisher of this name, commanding a ship called the Orangebovn; and an inlet stretching to the north-west, adjoining it, had such an appearance and position, as seemed to identify it with Gale Hamkes' Bay. The eastern head-land of this bay lies in latitude, about 74° 59′, and in longitude 18° 50′ W., differing from the meridian given to it by the best charts about seven degrees, and from that given to it by the charts, published for the use of the whale-fishers, 820 miles of longitude, or nearly fourteen degrees!

A little to the south-west of Gale Hamkes'

Bay is another inlet, to which I gave the name of KATER'S BAY; and to a bold tract of land lying a few leagues to the southward of this bay, I applied the name of WOLLASTON FORELAND, as a testimony of respect to two of the Commissioners of longitude. An opening a little farther south was named, in compliment to the Secretary to the Board of Longitude, YOUNG'S BAY. Wollaston Foreland will, I expect, prove to be an island of about four leagues in extent. It is remarkably black and mountainous; and at this time was less clothed with snow than any of the adjoining coast. After another tract of high land, of a somewhat different character, a considerable inlet was discovered, in latitude 74° 5′, in which no land towards the north-west was ever seen during our stay on the coast. It was named SCOTT'S INLET, in honour of Sir Walter Scott. A fine bold and picturesque *foreland* lies immediately to the southward of Scots's inlet, to which the name of Sir EVERARD HOME was applied.

In addition to the places now mentioned, other Capes and Bays were named in compliment to the following much respected individuals:—viz. Sir THOMAS BRISBANE, Dr BRINKLEY, Colonel BEAUFOY, Dr HOLLAND, Mr J. F. W. HERSCHEL, and my brothers-in-law the Rev. JOHN ARUNDEL, Captain JACKSON, and Mr JOHN CLARK, whose names appear in the northern part

of the general chart of researches which accompanies this volume.

The southernmost land hitherto seen, lying three or four leagues, S by E., true, from Home's Foreland, was taken to be Bontekoe Island, a place laid down in some charts, though not within fifteen miles of the same latitude. It is high, precipitous land, and of a particularly dark appearance. Its longitude I found to be 20° 40′ W., instead of 7° 5′ W., the position given to it in the charts for the whale-fisheries.

About half a degree of longitude to the westward of Bontekoe Island, is a remarkable headland, which is probably the same that was discovered by Henry Hudson, in the year 1607, and named by him Hold-with-Hope. From thence the land trends more to the westward.

In the midst of my operations for the survey of this coast, it fortunately happened, that the moon, at a convenient distance from the sun, for determining the longitude, became visible. This was a circumstance of great importance to me, and was instantly embraced, for correcting the rate of my chronometer; it being impossible altogether to depend on the going of a single timepiece. The weather was uncommonly favourable, so as to enable me to take the distances with the greatest precision. From six sets of distances

and altitudes, I obtained the mean longitude of 17° 54′ 30″ W., for the place of the ship on the 14th of June, and found the error of the chronometer to be nearly four minutes of time*.

These satisfactory observations for the longitude (established by many subsequent proofs), enabled me to ascertain the exact effect, in a particular case, of the extraordinary refractive property of the atmosphere in the Arctic Seas, which, without such proofs, would scarcely have been credible. The coast that has just been described, is in general so bold, as to be distinctly visible in the ordinary state of the atmosphere, at the distance of sixty miles; but on my last voyage into these regions, one part of this coast was seen, when at more than double this distance. The particulars were these:—Towards the end of July 1821, being among the ice in latitude 74° 10′, and longitude, by lunar observation and chronometer, (which agreed to twenty-two minutes of longitude, or within six geographical miles), 12°

* This lunar observation was afterwards proved, by comparing my chronometer with one of Captain Bennet's, and by correcting its rate by subsequent observations. All the longitudes mentioned, therefore, in this narrative, are corrected longitudes, and not exactly those given by the chronometer, at its original rate, which proved to be nearly two seconds per day wrong.

30′ 15′ W., land was seen from the mast-head to the westward, occasionally, for three successive days. It was so distinct and bold, that Captain Manby, who accompanied me on that voyage, and whose observations are already before the public, was enabled, at one time, to take a sketch of it from the deck, whilst I took a similar sketch from the mast-head, which is preserved in my journal of that year. The land at that time nearest to us was Wollaston Foreland, which, by my late surveys, proves to lie in latitude 74° 25′ (the middle part of it), and longitude 19° 50′: the distance, therefore, must have been at least 120 miles. But Home's Foreland, in 21° W. longitude, distinguished by two remarkable hummocks at its extremities, was also seen; its distance, by calculation, founded on astronomical observations, being 140 geographical, or 160 English miles. In an ordinary state of the atmosphere (supposing the refraction to be one-twelfth of the distance), any land to have been visible from a ship's mast-head, an hundred feet high, at the distance of 140 miles, must have been at least two nautical miles, or 12,000 feet in elevation; but as the land in question is not more than 3500 feet in altitude, (by estimation), there must have been an extraordinary effect of refraction equal to 8500 feet. Now, the angle corresponding with an altitude of 8500 feet, and a distance of 140 miles, is 34′ 47″,

the value of the extraordinary refraction, at the time the land was thus seen; or, calculating in the proportion of the distance, which is the most usual manner of estimating the refraction, it amounted to one-fourth of the arch of distance, instead of one-twelfth, the mean quantity.

That land was seen under these circumstances there cannot be a doubt; for it was observed to be in the same position, and under a similar form, on the 18th, 23d, 24th, and 25th July 1821, when the ship was in longitude from 12° 30′, to 11° 50′ W., and on the 23d it remained visible for twenty-four hours together; and though often changing its appearance, by the varying influence of the refraction, it constantly preserved a uniformity of position, and general similarity of character. In my journal of this day, I find I have observed, that my doubts about the reality of the land were now entirely removed, since, with a telescope, from the mast-head "hills, dells, patches of snow, and masses of naked rock, could be satisfactorily traced, during four-and-twenty hours successively." This extraordinary effect of refraction, therefore, I conceive to be fully established *.

* I am not aware that this land was ever seen by any British navigator, (excepting Hudson, and two or three whale-fishers, who have, at different times, been forced towards it by the ice, when closely beset), until the year 1817

In the course of the night a bear was seen prowling about upon one of the adjoining sheets of ice, which, soon afterwards attempting to swim across an opening near the ship, was immediately pursued by one of our boats, and attacked by the harpooner commanding it, who wounded it with a lance, and, after it had bravely given battle for some time, eventually overcame it. It was a fine large specimen, the skin, which was very white, and well furred, measuring about eight feet in length.

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when it was seen by myself, on the 29th of July, when the ship was in latitude 74° 0′, longitude 10° 37′ W. Its bearing being W by N. (true), the part of the coast in sight must have been Wollaston Foreland, at the distance of 152 miles. The apparent distance, however, being scarcely one-half of the true distance, I was led into an error respecting the longitude of the "West-Land:" the reason of which I take this opportunity of explaining. The supposed situation of this land was mentioned in a letter to the late Sir JOSEPH BANKS; through whom it was inserted in some of the polar charts, in the longitude which I had attributed to it. But the distance I calculated from was merely conjecture; and from my ignorance at the time of the full effects of the unequal refractions of these parallels, my conjecture happened to be very wide of the truth. Had I not had full proof, in the instance noticed above, of the extraordinary extension of vision by refraction, I should now have believed, that, however confident I was at the time of its being the land that I saw, I must have been mistaken.

We had expected to have seen very many of these animals on the coast of Greenland, as in a former voyage, on approaching this situation, we saw about a hundred, of which more than twenty were killed, and four taken alive; but in this expectation we were quite disappointed, not more than three having yet been seen, and of these only one, the bear now captured, having given us a chance of attacking it, the other two prudently keeping on the middle of a large field of ice, where we had little encouragement to pursue them.

When the bear is found in the water, crossing from one sheet of ice to another, it may generally be attacked with advantage; but, when on the shore, or more especially when it is upon a large sheet of ice, covered with snow,—on which the bear supporting itself upon the surface, with its expended paws, can travel with twice the speed of a man, who, perhaps, sinks to the knees at every step,—it can seldom be assailed with either safety or success. Most of the fatal accidents that have occurred with bears, have been the result of rencounters on the ice, or injudicious attacks made at such disadvantage.

A few years ago, when one of the Davis' Strait's whalers was closely beset among the ice at the "South-west," or on the coast of Labrador, a bear that had for some time been seen near the ship,

at length became so bold, as to approach alongside, tempted probably by the offal of the provision that had been thrown over-board by the cook. At this time, the people were all at dinner, no one being required to keep the deck in the then immoveable state of the ship. A hardy fellow, who first looked out, perceiving the bear so near, imprudently jumped upon the ice, armed only with a handspike, with a view, it is supposed, of securing all the honour of the exploit of capturing so fierce a visitor to himself. But the bear, regardless of such weapons, and sharpened probably by hunger, immediately, it should seem, disarmed his antagonist, and, seizing him by the back with his powerful jaws, carried him off with such celerity, that, on his dismayed comrades rising from their meal, and looking abroad, he was so far beyond their reach as to defy their pursuit.

A circumstance, communicated to me by Captain Munroe of the Neptune, of rather a humorous nature as to the result, arose out of an equally imprudent attack made on a bear in the Greenland fishery of 1820, by a seaman employed in one of the Hull whalers. The ship was moored to a field of ice, on which, at a considerable distance, a large bear was observed prowling about for prey. One of the ship's company, emboldened

ed by an artificial courage, derived from the free use of his rum, which, in his economy, he had stored for special occasions, undertook to pursue and attack the bear that was within view. Armed only with a whale-lance, he resolutely, and against all persuasion, set out on his adventurous exploit. A fatiguing journey of about half a league, over a surface of yielding snow, and rugged hummocks, brought him within a few yards of the enemy, which, to his surprise, undauntedly faced him, and seemed to invite him to the combat. His courage being by this time greatly subdued, partly by the evaporation of the stimulus he had employed, and partly by the undismayed, and even threatening aspect of the bear, he levelled his lance in an attitude suited either for offensive or defensive action, and stopped. The bear also stood still. In vain the adventurer tried to rally courage to make the attack; his enemy was too formidable, and his appearance too imposing. In vain also he shouted,—advanced his lance,—and made feints of attack; the enemy either not understanding them, or despising such unmanliness, obstinately stood his ground. Already the limbs of the sailor began to shake,—the lance trembled in the rest,—and his gaze, which had hitherto been stedfast, began to quiver; but the fear of ridicule from his messmates

still had its influence, and he yet scarcely dared to retreat. Bruin, however, possessing less reflection, or being more regardless of consequences, began, with the most audacious boldness, to advance. His nigh approach, and unshaken step, subdued the spark of bravery, and that dread of ridicule, that had hitherto upheld our adventurer; he turned and fled. But now was the time of danger. The sailor's flight encouraged the bear in his turn to pursue; and being better practised in snow-travelling, and better provided for it, he rapidly gained upon the fugitive. The whale-lance, his only defence, encumbering him in his retreat, he threw it down, and kept on. This fortunately excited the bear's attention; he stopped, —pawed it,—bit it, and then resumed the chace. Again he was at the heels of the panting seaman, who, conscious of the favourable effect of the lance, dropped a mitten: the stratagem succeeded, and, while bruin again stopped to examine it, the fugitive, improving the interval, made considerable progress *a-head*. Still the bear resumed the pursuit, with the most provoking perseverance, excepting when arrested by another mitten, and finally by a hat, which he tore to shreds between his teeth and his paws, and would no doubt have soon made the incautious adventurer his victim, who was rapidly losing

strength and heart, but for the prompt and well-timed assistance of his shipmates, who, observing that the affair had assumed a dangerous aspect, sallied out to his rescue. The little phalanx opened him a passage, and then closed to receive the bold assailant. Though now beyond the reach of his adversary, the dismayed fugitive continued onward, impelled by his fears, and never relaxed his exertions until he fairly reached the shelter of the ship! Bruin once more prudently came to a stand, and for a moment seemed to survey his enemies with all the consideration of an experienced general; when, finding them too numerous for a reasonable hope of success, he very wisely wheeled about, and succeeded in making a safe and honourable retreat.

A thick fog prevailed the greater part of the 15th of June, and so bewildered us, that we with difficulty found room for working the ship. As we were anxious to escape from our confinement, we occasionally explored the boundaries and recesses of the ice to which we had access; and in the evening, when thus employed, fortunately discovered an outlet leading to windward, through which we succeeded in beating a passage, though the width was not above a hundred yards. This led us to the west side of the field that had detained us on the 10th, and some preceding days.

Here we "dodged" during a gale of wind which we had on the following day. Seven or eight ships were at this time discovered from the mast-head, at a distance to the eastward: their appearance excited considerable interest with all hands, from the circumstance of our having been for a long time entirely alone.

On Monday morning, June 17th, we proceeded in search of openings amid the southern floes, and succeeded in finding an outlet in the desired direction. In the afternoon, we fell into a sea of a fine turbid green colour, which gave us increased hopes of whales; and, about midnight, I was gratified by the appearance of one, but it was at a great distance, and retired out of sight before the boats could reach the place.

The weather was perfectly clear, and the land in sight all the day; although a few miles to the eastward of us there was evidently a thick fog. As we advanced to the southward, some additional headlands lying to the westward of us were discovered, and the bearings of them taken. I obtained good sights for the longitude, both in the forenoon and afternoon, which agreed to a mere trifle: the mean was 17° 40′ 10″ W. A set of azimuths gave the variation 43° 15′ W. The latitude at noon was 73° 17′.

On the 18th, there being many appearances of

the proximity of whales, we penetrated the main western ice, through a most intricate navigation, for some miles; but finding the colour and quality of the water changing to blue and transparent, we returned.

An opportunity again occurred of prosecuting my surveys, and some additional bays, islands, and headlands appeared in sight; but the distance was too great for getting the accurate outline. An opening of the land, the head of which was not seen, occurs about five leagues to the westward of Bontekoe. It was named, in compliment to Sir George S. Mackenzie, MACKENZIE'S INLET. Its direction appears to be NW., true. To the southward of this, is a bold foreland, the extremities of which are crested by two remarkable hills. The northern one received the name of CAPE GIESECKE, in compliment to Sir Charles Giesecké of Dublin; and the southern one obtained the name of CAPE FRANKLIN, after the persevering commander of the overland expedition for exploring the coasts of the Arctic Ocean. A cape a little more southerly, was named in compliment to the celebrated traveller Baron ALEXANDER DE HUMBOLDT; and three others still farther to the southward, out of respect to M. De ROSSEL, member of the Institute of France; the Marquis de la PLACE; and M. FREYCINET, who circumna-

vigated the globe in the Uranio. A small island lying to the westward of Bontekoe, I named after Captain BENNET, of the Venerable whaler, who furnished me with some chronometrical observations on the longitudes of two or three adjoining headlands, which very nearly corresponded with my own. Our latitude at noon was 73° 1′; longitude, by chronometer, 18° 1′ W.

In the evening, we stretched a few miles to the eastward, and fell in with some whales. Two ships that were on the "ground" before us made captures. Several other vessels afterwards came up, but neither they nor we were successful.

On the 19th of June, the weather was calm and clear; the sun warm, and almost oppressive. The sea reflected objects as accurately as a mirror, its surface for hours being unruffled by a breeze. The strong action of the sun's rays soon produced such an unequal density in the atmosphere, that some of the most extraordinary phenomena to which this circumstance gives rise, were exhibited. The land, to appearance, was suddenly brought fifteen or twenty miles nearer us; its boldness and clearness, as seen from the deck, being superior to what its elevation and distinctness had previously been, as seen from the mast-head. The ice about the horizon assumed various singular forms:—hummocks became ver-

tical columns,—floes and fields arose above the horizon, like cliffs of prismatic-formed spar,—and, in many places, the ice was reflected in the atmosphere at some minutes elevation above the horizon. The ships around us, consisting of eight or nine sail, presented extraordinary characters. (Plate II. fig. 2.) Their sails and masts were strangely distorted. Sometimes the courses would be depressed to almost nothing; the top-sails expanded to near four times their proper height, and the topgallant-sails truncated. Occasionally a very odd spectacle occurred: an additional sail appeared above the topgallant-sail, like a royal hanging loose; and sometimes the expanded top-sail, divided into two distinct sails, by the separation of all the additional height given by the refraction, which, slowly rolling upward, as it were, like the lifting of a curtain, dispersed, and became invisible, after leaving the mast-head. Above some distant ships, there was an inverted image in the air, many times larger than the object itself: this, in some instances, was at a considerable elevation above the ship; but it was found to be of a less size whenever the original and the image were not in contact. The image of one ship was distinctly seen for several minutes together, though the object to which it referred was not in sight! One ship was crowned with

two images; the first an inverted one, and the second, a circumstance I never before observed, in its proper position. Altogether, the shipping, and other objects around us, presented a most amusing spectacle. They were perpetually changing their appearance, and afforded me abundant entertainment for hours together. The most remarkable effect produced, was on the most distant objects, the interesting appearances of which not being discernible without the use of a telescope, probably escaped general observation.

CHAPTER V.

LOSS OF A HARPOONER BY A WHALE.—TWO WHALES AND THREE NARWALS TAKEN.—ANATOMICAL STRUCTURE OF THE NARWAL.—REMARKABLE ATMOSPHERIC REFRACTIONS.

We had a breeze of wind on the 20th, under which we cruised the whole day, among floes and drift-ice, in search of whales. A straggler was occasionally seen and pursued, though without success; and, towards night, two or three were discovered together, by the glass, at the distance of about a league. All our boats were dispatched in pursuit, while we endeavoured to follow them with the ship, through a narrow channel, between a large floe and a quantity of crowded drift-ice. But the wind being against us, and the ice closing, we had to work in places not a hundred yards wide, and these encumbered with "pieces," until at length there was scarcely room to get the ship round. Not having a boat on board, we were in much perplexity how to act; but having fortunately grappled a floe, we warped smartly to windward, and just escaped at the moment that the floe and loose ice came in contact, close to the

ship's stern. Our difficulties, however, were not yet over; for, on attempting to take sail, the ship unavoidably struck the last piece of ice that was in the way, and launched fast aground on a "tongue" or shelf that projected from beneath it, at the depth of twelve or fifteen feet. Here we remained for two or three hours occupied in fruitless exertions for our extrication. On the arrival of some of the boats to our assistance, other schemes were resorted to; but these were not effectual, until an accidental fracture of the ice occurred, and liberated us.

As soon as these annoying duties enabled me to direct my attention to the boats, I found that two of them were missing. I looked in vain for them from the mast-head, sweeping the sea and ice all round with the glass, and dwelling on every different field of view that it embraced in the circuit, until I was almost blinded by the closeness of the observation, and the intensity of the light. The arduous duties of my profession had occupied me, at the mast-head, fifteen or sixteen hours almost incessantly. The sky being clear, the weather moderate or calm, and the sun extremely brilliant, the light (reflected and direct) became excessive: it was too much for the sight, and produced such a degree of inflammation in my eyes, and acute headache, that I was under

the necessity of discontinuing the personal search for the boats, and of retiring below to seek a little rest. In the mean time, four boats were dispatched, in two parties, to look for their comrades; but, after a search of four hours, they returned unsuccessful.

I now arose and renewed the examination of the ice and sea around, and was at length rejoiced by the sight of the boats in the eastern quarter, "pulling" towards the ship.

On their approach, we were a little surprised by some unusual appearances, particularly by the obvious want of their proper complement of oars, and the solemn countenances of the rowers; but a deficiency in the number of men was neither observed nor suspected. As soon as they came within hail, my anxiety induced me to call out, and enquire what had happened. "A bad misfortune indeed," replied the officer commanding the first boat, "*we have lost Carr!*" This awful intelligence, for which we were altogether unprepared, shocked me exceedingly; and it was some time before I was able to enquire into the particulars of the accident, which had deprived us of one of our shipmates. As far as could be collected from the confused accounts of the crew of the boat, of which he went out in charge, the circumstances were as follow. The two boats that had been

so long absent, had, on the outset, separated from their companions; and allured by the chace of a whale, and the fineness of the weather, they proceeded until they were far out of sight of the ship. The whale they pursued led them into a vast shoal of the species: they were, indeed, so numerous, that their "blowing" was incessant; and they believed they could not have seen less than a hundred. Fearful of alarming them without striking any, they remained for some time motionless, watching for a favourable opportunity to commence an attack. One of them at length arose so near the boat of which William Carr was harpooner, that he ventured to pull towards it, though it was meeting him, and afforded but an indifferent chance of success. He, however, fatally for himself, succeeded in harpooning it. The boat and fish passing each other with great rapidity after the stroke, the line was jerked out of its place, and, instead of "running" over the stem, was thrown over the gunwale; its pressure in this unfavourable position so careened the boat, that the side sank below the water, and it began to fill. In this emergency the harpooner, who was a fine active fellow, seized the bight of the line, and attempted to relieve the boat, by restoring it to its place; but by some singular circumstance, which could not be accounted for, a turn of the line

flew over his arm, in an instant dragged him overboard, and plunged him under water, to rise no more! So sudden was the accident, that only one man, who had his eye upon him at the time, was aware of what had happened; so that when the boat righted, which it immediately did, though half full of water, they all at once, on looking round at an exclamation from the man who had seen him launched overboard, enquired what had got Carr! It is scarcely possible to imagine a death more awfully sudden and unexpected. The murderous bullet, when it makes its way through the air with a velocity that renders it invisible, and seems not to require a moment for its flight, rarely produces so instantaneous destruction. The velocity of the whale on its first descent, is usually (as I have proved by experiment) about 8 or 9 miles *per* hour, or 13 to 15 feet *per* second. Now, as this unfortunate man was occupied in adjusting the line at the very water's edge, when it must have been perfectly tight, in consequence of the obstruction to its running out of the boat, the interval between the fastening of the line about him and his disappearance, could not have exceeded the third-part of a second of time; for in one second only, he must have been dragged to the depth of 10 or 12 feet! The accident was, indeed, so instantaneous, that he had not time for

the least exclamation; and the person who witnessed his extraordinary removal, observed, that it was so exceedingly quick, that although his eye was upon him at the instant, he could scarcely distinguish the object as it disappeared.

As soon as the crew of the boat recovered from their consternation, they applied themselves to the needful attention which the lines required. From the accompanying boat, on the rising of the fish to the surface, a second harpoon was struck, and some lances applied; but the melancholy providence that had occurred, had cast such a damp upon all the men employed in this business, that they became timid, cautious, and inactive in their subsequent duties. The fish, when nearly exhausted, was, in consequence of this, allowed to remain for some minutes unmolested on the water, until having recovered some degree of energy, it made a violent effort, and disengaged itself from both the harpoons.

Our exertions thus proved altogether fruitless; and were attended with serious loss. In all respects we were extremely unfortunate. Besides the whale above mentioned that was lost when in a dying state, two others, that were partially harpooned, likewise escaped us; and another, which a harpooner was just about to strike, sank at the moment in a fright, occasioned, not

by the approach of the boat, but in consequence of a fulmar's darting upon its back, and plunging its beak in the skin. Several ships within sight were more successful: the John killed two whales, and two or three others a whale each.

A ship at a distance, supposed to be the Bremen of Bremen, was seen with an ancient flying, a signal indicative in the whale-fishery of a *full-ship*. The effect of a sight of this kind on the minds of unsuccessful fishers, is of a painfully despondent nature. They see their fortunate neighbours returning prosperously home to their families and friends, with the cheering consciousness of their full cargo insuring them a welcome from their employers; while the yet labouring fishers, who have failed to succeed in their endeavours, have the further and increased difficulties and dangers of the foggy season to undergo, together with the oppressive anxiety which the uncertain issue of the voyage almost constantly calls forth. These feelings are, doubtless, the most distressing, where they are augmented by the influence of envy; and they are the least felt by those who commit their way unto the Almighty, and trust in him, with full reliance on the promise that "he will bring it to pass." The Bremen was early at the sealing-stations, and made a most successful attack upon these animals; her active commander

then improving the opportunities for whaling which he met with, made up his cargo at this uncommonly early period of the fishery.

The latter part of this adventurous day (the 21st of June), together with the day following, we spent in cruising about with unremitting perseverance among the drift-ice and floes, which were in great quantities around us; but although we saw several whales, and ships in all directions about us were occasionally making captures, we were altogether unsuccessful.

On the 23d, being Sunday, we rested. We had public worship as usual; the weather being calm during the service in the forenoon, all hands were enabled to attend. The arduous, yet unsuccessful labours of the preceding week, rendered repose from the busy cares of our profession particularly acceptable; and the melancholy loss of one of our number had a solemnizing effect on every mind, that was extremely favourable for devotion. As my crew were entirely dependent on me for religious instruction, I thought it my duty to address them, with the particular view of improving the serious impression evidently made upon them, by the awful death of William Carr. He was much esteemed by all on board: he was the bosom friend of one or two; the mess-mate and watch-mate of many; the kind companion of all. All, therefore,

knew and respected him, and were deeply interested in his fate. The consciousness, that his fate might have been any of theirs, naturally led to the personal enquiry, whether they were prepared to meet their God. The consciences of some, no doubt, replied in the negative: they, perhaps, discovered, for the first time, that religion was not a mere name, or profession only, but an active internal principle; and that its general acknowledgment, or even the performance of its outward duties, could not benefit them, without their partaking of its personal influence. The solemn demeanour and striking attention of our little company, marked the interest which every one felt on the occasion. The eyes of many strongly indicated the deep emotions of their hearts; and the weather-beaten cheeks of some were suffused with a copious flow of tears, that forcibly displayed the powerful feelings of benevolence or devotion by which they were impressed.

A thick fog, which had prevailed for more than four-and-twenty hours, dispersed about 10 P. M; on which we found ourselves surrounded by floes, and very nearly beset. We were unable to extricate ourselves until next morning, when, a strong gale having put the ice in motion, we found a passage to the eastward. In the night, the weather became very bad, blowing excessively

hard, with thick snow; so that there was considerable difficulty in working the ship, among the innumerable sheets of ice with which we were encompassed. The whole of these we were not so fortunate as to avoid; one piece was struck in " stays," the ship having got " stern-way," which materially damaged the rudder.

It continued to blow hard, with thick snow, the whole of the 25th. Having obtained smooth-water, under the lee of a floe, we were enabled, notwithstanding the gale, to pursue several whales that were seen in the course of the day. Some near approaches were made by our different harpooners, and one of the fish was struck; but, after withdrawing about 300 fathoms of line, the harpoon retracted, and the prey escaped. We still kept the boats on the watch; and, towards evening, another whale was harpooned in a manner that proved effectual. It took 960 fathoms of line from the " fast-boat," and was re-struck and killed, after an interval of about three hours. It proved a valuable prize, being estimated to yield at least twenty tuns of oil, and a ton weight of whale-bone. The longest lamina of the whale-bone measured eleven feet three inches.

At 6 o'clock of the following morning, (the 26th of June), the snow ceased, the weather cleared, and the land was seen distinct and bold from the deck.

The whales having all left us, we proceeded to windward in search of them, into a large clear opening, several leagues in breadth, which had been produced by the influence of the gale. In beating through a bar of ice to reach this opening, the most extraordinary alterations in the colour of the sea, that I ever witnessed, occurred. The place where we made the last capture, was an olive-green sea, very dark and turbid; but, in making a stretch to the north-westward, we suddenly passed into a perfectly blue and transparent water. Regular alternations of a green and blue sea were afterwards observed on every tack the ship made. So striking, in one place, was this change, that the eastern extremity of a piece of ice not thirty yards in diameter, was in blue water, and the western extremity in green; and the line of separation of the two colours was so well defined, that it could be determined to within a yard. This circumstance was observed from the mast-head, as the ship passed the piece of ice referred to; and the colours of the water were distinctly shewn by the light reflected from a tongue, or shelf, of the ice, at a considerable depth under the surface. And in proof that there was no optical deception, other masses of ice, in the same general line, exhibited similar appearances. On one of these, repeated alternations of green and blue wa-

ter took place, and were clearly exhibited on its encompassing tongues; from which, the line of separation was found to be slightly waved.

In the evening, we made a stretch toward the land, which was nearer than usual. I took sights for the longitude of the ship, which gave 18° 48′ W.; and found the latitude to be 71° 9′. A series of bearings of the land, and a sketch of about ninety miles of coast, were obtained in this situation. The angular extent of the land in sight was from NW by W. (true) to SW. A strong refraction having occurred during the time of making the observations, brought quite distinctly into view some land to the northward, that was considered to be at the distance of nearly eighty miles.

I had just finished my observations, when a sail not hitherto seen, bore down to us, which proved to be my Father's ship, the Fame. I went on board of her, and had the happiness of finding my Father, and my only brother, who accompanied him, in good health. Their success exceeded ours, by one whale; but was not materially different as to the quantity of blubber obtained. We proceeded to cruise for whales in company. Towards the land, the ice, in this parallel, consisted of a large aggregation of fields and floes, and appeared not yet to be pervious.

Two or three whales were seen about its margin. The sea was almost covered with roaches (Little Auks) which were busily engaged in picking up the shrimps and other insects, that seem generally to abound in the green coloured water.

We were employed most of the next day (the weather being calm and foggy) in "making off" the blubber of the whale captured on the 25th.

As the ice was too compact, in all directions, to afford a safe passage towards the north, the course I wished to pursue, while the weather was foggy, we were obliged to remain stationary the whole of the 28th; but, at an early hour of the following morning, it "cleared up," and enabled us to resume the search for whales.

During the fog, we killed a very large narwal. It measured 15 feet 4 inches in length, and 9 feet 4 inches in circumference. It was a male, and had a horn or tooth 7 feet 6 inches long, externally, besides 15 or 16 inches of the same imbedded in the skull. Being an aged animal, the skin was almost wholly white. On the back and sides, however, there were a few grey oblong spots or patches; and on the sides and belly a number of bright yellow specks. This latter colour, which was quite superficial, seemed to be the effect of age, or of cutaneous disease. It was remarkably fat, having a covering of blubber, over the muscu-

lar parts, four inches in thickness. The tooth, which in this animal is a solitary one, was covered, over the greater part of its surface, with a greasy substance, forming a blackish-brown incrustation. The under side of the horn, however, and a few inches of the point, were quite clean, white, and polished. These parts, it would therefore seem, are brought into some use, which prevents the adherence to them of the common incrustation.

A thick fog set in on Saturday afternoon, and continued almost the whole of Sunday, the 30th. It was often so dense that we could scarcely see far enough to tack the ship clear of the ice.

On Monday, July 1st, the fog gave place to rain, which somewhat extended the limit of vision. We immediately made sail; and, after beating all night to the south-eastward, to round a point of ice, we penetrated between two chains of floes towards the NNE, until we fell in with several whales. Three vessels near us all made captures; but we were not successful.

The next day was perfectly calm, and the weather fine. In a bight formed by the union of a floe with a body of drift-ice, a great number of whales were discovered. All the boats were dispatched in pursuit, and remained on the watch, or in chase, for about ten hours; but the weather was so calm and still, that almost every fish they

approached within a ship's length, took the alarm. The boats having been recalled by signal, two were sent, as a last effort, into a promising situation, on the borders of a floe, where they had not remained long, before a large whale arose near one of them, and received a harpoon. It remained nearly an hour invisible, and then arose exhausted to the surface, close to the place where the ship was made fast to the ice. A second harpoon was immediately fastened, and it was so promptly plied with lances, that it had not power to descend afterwards, but died in a few minutes, within fifty yards of the ship. The extraordinary exhaustion of this whale, was owing to the long time it remained under water, and the depth to which it descended. Most other animals, when attacked, instinctively pursue a conduct which is generally the best calculated to secure their escape; but not so the whale. Were it to remain on the surface after being harpooned,—to press steadily forward in one direction,—and to exert the wonderful strength that it possesses; or were it to await the attacks of its enemies, and repel them by well-timed flourishes of its tremendous tail, it would often victoriously dispute the field with man, whose strength and bulk scarcely exceeds a nine-hundredth part of its own. But, like the rest of the lower animals, it was designed by Him who

"created great whales, and every living creature that moveth," to be subject to man; and, therefore, when attacked by him, it perishes by its simplicity. Instead of repelling his attacks, it generally dives at once to an immense depth, where, under a pressure often exceeding 200,000 tons * upon its body, it becomes so exhausted, that, on its return to the surface of the sea, it becomes an easy prey.

The conduct of the whale, in this respect, intimates, that the instinctive faculty generally possessed by the lower animals, and employed for the purpose of self-preservation, directs it to descend to the depths of the ocean for escaping its natural enemies in the same element; and it farther intimates, that, whatever these enemies may consist of, whether sword-fish, thrashers, or sharks, since it avoids them by this means, it must be able to descend lower, and to sustain a greater degree of pressure from the superincumbent wa-

* It may assist our comprehension of the enormous load that the whale endures, when it descends to the depth of 800 fathoms, which it is often known to do, to be informed, that the pressure of the water at this depth, on the body of a whale, must sometimes exceed the weight of sixty of the largest ships of the British navy, when manned, provisioned, and fitted for a six months' cruise!—(Account of the Arct. Reg., vol. ii. p. 250.)

ter, than any of the animals that are in the habit of attacking it.

Besides the whale now captured, we killed, during our stay near the same place, two female narwals, one of which, a case most extraordinary, if not unprecedented in this sex, had an external horn. The horn was 4 feet 3 inches in length, of which 12 inches were imbedded in the skull. It had also a milk tusk, as is common in others of the sex, 9 inches long, of a conical form, and obliquely truncated at the thicker end, without the knob found in many of the milk tusks. The horn, as in the male, was on the left side of the head, and the spiral *dextrorsal.* The length of the animal was 13 feet 6 inches. It was beautifully variegated with bluish-black or grey spots. It differed in no respect from other females of the same age, excepting with regard to the horn.

The other narwal that was killed at this time, had two milk-tusks, as usual, concealed in the bone of the skull. They were both eight inches long, with a small oblique irregular knob at the base.

My Father sent me the contents of the stomach of a narwal, killed a few leagues to the westward of us, which were very extraordinary. They consisted of several half digested fishes, with others, of which the bones only remained. Be-

sides the beaks and other remains of the cuttle-fish, which seems to constitute the general food of this animal, there was part of the spine of a *pleuronectes*, or flat-fish, probably a small turbot; fragments of the spine of a *gadus;* the back-bone of a *raia;* with another of the same genus, evidently the *R. batis*, or skate, almost entire. The latter was 2 feet 3 inches in length, and 1 foot 8 inches in breadth. It comprised the bones of the head, back, and tail; the side-fins, or wings, the eyes, and considerable portions of muscular substance.

It appears remarkable, that the narwal, an animal without teeth, excepting an external one, a small mouth, with stiff lips, and tongue that does not seem capable of protrusion, should be able to catch and swallow so large a fish as the skate, the breadth of which is nearly three times as great as the width of its own mouth. As the animal in which these extraordinary remains were found, was a male, with a horn of seven feet, I apprehend that this instrument had been employed in the capture of the fishes on which it had recently fed. It seems probable, that the skates had been pierced with the horn and killed, before they were devoured; otherwise it is difficult to imagine how the narwal could have swallowed them; or how a fish, of any activity, would have permitted itself to be taken and sucked down the throat of a

smooth-mouthed animal, without teeth to detain and crush it, or any apparent means of compressing it.

The occasional capture of the narwal, on this and a former voyage, afforded me some new facts in their natural history and anatomy, which it may not be out of place to insert here.

The following description, as far as dimensions are concerned, refers to a male narwal of fourteen feet in length, exclusive of the horn. In other respects, these particulars, with a very few exceptions, would equally apply to all the males of the same species.

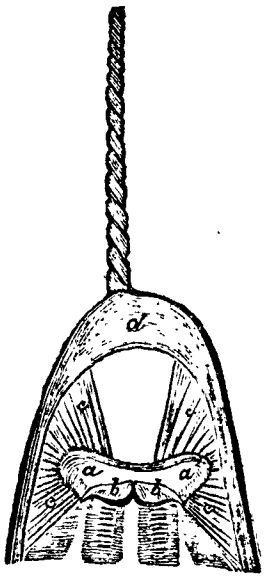
The colour of the skin was white, or yellowish-white, with patches and irregular spots of grey and brownish black. In younger animals, the white is less predominant. In one of the same sex, 10 feet 8 inches long, with an external horn of 19 inches, the colour was much darker; the back, head, and part of the sides, being black, and the rest of the body speckled with grey or white; but no part entirely white. The opening of the ear was six inches behind the eye, on the same horizontal line. Its diameter was not greater than that of a small knitting-wire. The eyes were fifteen inches distant from the snout.

The fin, which in the common whale is flat, is

in this animal much curved. Where it is fixed to the body, it is elliptical, the longest axis lying longitudinally; so that when the fin is elevated to its swimming position, it is horizontal. The point, or tip, is bent upwards, or towards the back; the fin, in a swimming posture, is consequently concave above, and convex below. The thick edge is forward; the thin edge towards the tail. The use of the fin, being horizontal, in swimming, is evidently to balance the animal; while the tail is the chief organ of motion, and is also used in turning. That the fins are not generally used for either swimming or turning, appeared probable, from several observations made on these animals with a telescope from the masthead. The fins were always seen steadily extended; and when the animal changed its direction, the tail was bent suddenly and obliquely to one side, and then slowly returned back, in such a way, that a progressive motion and a change of direction were produced by the same effort: the fins mean time were motionless. In the mysticetus, however, where the fin is much larger in proportion than in the narwal, it may have other uses. In all animals of the whale tribe, the fins must be employed in turning to one side, or on the back.

The blowhole is one external semilunar open-

ing, expanding immediately within the skin into a sac, or air-vessel, six or eight inches wide, and extending laterally and forward into two cavities (*a a* of the annexed figure, which is the appearance of the upper part of the head of the narwal, when the skin and fat are sliced off horizontally),



one on each side, the extremities of which are about twelve inches apart. These contain a portion of a mucous substance. The whole sac is lined with a thin greenish-black skin. At the posterior extremity of the cavity, or sac, are seen

the blow-holes, now divided into two and forming distinct canals in the skull. They are closed by a valve *b b* (represented on an enlarged scale in the adjoining figure) resembling what is called

a hare-lip, one lobe of which covers each canal. This valve, in the narwal, does not enter the canal in the skull (as it does in the whale), but merely closes flat down upon it; yet it effectually excludes the sea-water from the lungs, whatever be the pressure: it becomes, in fact, firmer and closer in proportion as the weight of water is greater. The valve is about six inches wide, and is opened and shut by two radiated muscles, *c c*. It is detached from the skull beneath, about six inches from the pipes towards the snout. In consequence of this separation, the valve has sufficient freedom in itself, and sufficient room in the adjoining sac, to be drawn upward and forward, so as to expose the breathing canals; or falling upon them, like the valve or clapper of a pump-box, to secure them against the entrance of water. The two lobes of the valve are united together by a fleshy septum, connected slightly with the cartilaginous part of

the bony septum between the blow-holes in the skull.

On the 3d of July no whales were to be seen. Having a fine breeze from the northward, we cruized the whole day in the recesses of the floes; and in the night, under a fresh gale of wind, we made a stretch of about twenty miles to the eastward, and back again. It blew a strong gale all the next day, during which we made fast to a large floe, and made-off the blubber of our last captured fish. The weather was thick, with fog or snow, the greater part of the gale; but in the evening it cleared up, and soon afterwards the wind moderated. An immense quantity of roaches (*Alca alle*) flew past the ship towards the west. For many hours successively, perhaps from one to three flocks, consisting on an average of about two or three hundred birds, passed us *per* minute, all winging their way in the same direction. I calculated that near half a million of these birds appeared within sight in the course of twelve hours.

On the 5th at noon, we were in latitude 71° 7′, longitude 18° 40′ W. Having reached a considerable distance to the northward, we fell in with a large fleet of ships. In the evening, I was visited by my Father, and also by the captains of the

John and Venerable. With Captain Bennet, of the latter ship, who had a chronometer with him, I compared the time, and found to my satisfaction that our chronometers only differed fifty-five seconds.

On the 6th and 7th, we had a brisk gale from the northward, with snow, sleet, rain, or fog continually. Though we were beating to windward most of the time in smooth water, and apparently made great progress, carrying a pressure of sail, yet we eventually found, that the southerly current had so operated against us, that we scarcely increased our latitude a league.

The 8th of July was a fine clear day, with brilliant sunshine. Some land to the northward being seen for the first time, I attempted to carry on my survey; but the whole coast was found to be so disfigured by refraction, that I could not recognise a single mountain or headland. The wind having changed to southwest, we made rapid progress towards the north. At midnight, we hove-to, at the edge of a large heavy field, where a narwal and several razor-backs (*Balœna physalis*) had been seen, but no whales.

The morning of the 9th was brilliant, with light winds, and a highly refractive state of the atmosphere. The land, and a number of ships that came within sight, as well as the ice, and

indeed all distant objects, were strangely distorted. Inverted images of two ships, occasionally double, were seen in the air, which, I imagine, were at least ten miles beyond the limit of direct vision; for we approached them about this distance without being able to see them. (See Plate IV. fig. 1.). In addition to the phenomena observed and described on the 19th of June &c. I noticed several vessels that had their hulls elevated to the apparent magnitude of a castle; the height of the hull, in some instances, being equal to that of the masts: in two or three positions, the courses seemed to be separated twenty or thirty yards from the hull, instead of being nearly in contact, (Plate IV. fig. 2.). So unequal was the refraction, and so various in its effects, that while in one ship the masts were uniformly expanded, or the hull magnified,—in another ship the courses and topgallant-sails were heightened, and the intermediate sails, the top-sails, contracted to one-fourth their proper size,—and in a third, a very little distance from this, the courses and topgallant-sails were contracted, and the top-sails expanded. In all these examples, the peculiarities were continually varying. No sooner had one appearance been examined and sketched, than it changed, and often exhibited the most uncouth proportions. The distant ice partook also of the

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Fig. 1.- July 9th

Fig 2 - July 9th

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W H Lizars sculpt

same influence, and presented very extraordinary and often beautiful resemblances to magnificent architectural structures.

These interesting exhibitions were at length closed by the commencement of a dense fog, which was productive of a most disagreeable transition of feeling:—from the exhilarating enjoyment of a pure atmosphere, and warm sunshine, with extensive and interesting prospects, we were in a moment enveloped by a depressing and impenetrable gloom. Our latitude at noon was 72° 10′, and longitude 18° 0′ W. Saw two or three whales.

The two following days were intensely foggy, so that we could seldom see the ice above a hundred yards. During a few hours when it was at the densest, it neither wetted the rigging nor the decks of the ship,—a circumstance not very common in the arctic fogs; but it was followed by a fog so damp, that it loaded the sails and rigging with ice.

On the 12th, we had the wind almost all round the compass, and blowing of various strengths, between a gale and a calm. Having stood for several hours to the westward in the thick, we found ourselves nearer to the land, when it cleared up, than we had hitherto been. Our longitude, by chronometer, was 20° 0′ W. Bearings and sketches of the land to a considerable extent

were obtained. Though there was a great deal of ice about us, yet we could have penetrated farther, by doubling a chain of floes, had we had any encouragement to proceed. On the contrary, however, the sea was blue and transparent,—all the birds had deserted us,—and every usual sign of whales had disappeared. Anxious as I was to get close in-shore, for purposes of investigation, I could not justify myself in attempting research in a case where it was apparently at variance with the probable success of the voyage. I was therefore reluctantly constrained to retire.

The night was calm and foggy, but the next morning having a brisk breeze, we steered to the eastward most of the day. At 8 P. M. we fell in with a large field of ice, the edge of which we traced nearly twenty miles towards the east and north-east: at midnight hove-to.

It is somewhat remarkable, that, for several days and even weeks preceding this date, a lower temperature was experienced with southerly than with northerly winds. During a fresh gale from the NbE., for example, on the 6th and 7th of July, the temperature was within the limits of 35 and 32 degrees. From the 8th of July to this day (13th), when the wind was mostly from the southward, the mean temperature was about 32°; and in the evening of this day, with a south

wind, which, it is presumed, ought to be the warmest, the thermometer fell to 29°.

On the 14th, being Sunday, we remained as nearly stationary as the crowded state of the ice by which we were enveloped would permit, for the purpose of " honouring the Sabbath," and giving all hands an opportunity of joining in public worship, and spending the day in religious exercises.

CHAPTER VI.

A SMALL WHALE CAPTURED.—REMARKS ON ITS ANATOMICAL STRUCTURE.—ITS BLOW-HOLE VALVES.—ITS WEIGHT. — ITS PHYSIOLOGY. — FOGGY WEATHER.—CAUSE OF ARCTIC FOGS.—BEAUTIFUL AND SINGULAR EXAMPLES OF THE OPTICAL EFFECTS OF UNEQUAL REFRACTION.—REMARKS ON THE CAUSE OF THESE PHENOMENA.

VERY early on Monday morning (15th July), a small whale, the first of the species that had been seen for nearly a week, made its appearance very near the ship. Two boats were dropped immediately, and the fish was harpooned and captured. Though it was little above the age and length of a "sucker," the whalebone only measuring 2 feet 8 inches, it was so extremely fat, that we obtained a quantity of blubber from it, calculated to yield six tuns of oil; a produce equal to that of "a size-fish" of 6 or 7 feet bone.

As the whale is flensed while afloat, with nearly the whole of the carcass under water, few opportunities of examining its anatomical structure occur. The smallest animals of the species, mere cubs or

"suckers," may, indeed, be hoisted upon deck; and it is in their case only, that I have had the chance of inspecting them entirely out of the water. The head of the whale now taken was hoisted on board in a mass; and the body, when stripped of the fat, was so small, as to be quite within the powers of our tackles. Some new facts, respecting the anatomy of the whale, arose out of the investigation of this and another of the species killed in the summer of 1821, which I shall now attempt to describe. The following measurements and weight, it must be observed, all refer to a sucking whale, that at the time of capture was under maternal protection; but the other details, in general, may be considered as applying to the whole species of the Balæna mysticetus.

This whale, though a "sucker," was 19 feet in length, and 14 feet 5 inches in circumference, at the thickest part of the body. The external skin, consisting of cuticle and rete mucosum, was, on the body, an inch and three-quarters thick, being about twice the thickness of the same membranes in a full grown animal. The blubber, on an average, was 5 inches in thickness. The largest of the whalebone measured only 12 inches; about one-half of which was imbedded in the gum. The external part of these fringes, not exceeding 6 inches in length, did not seem sufficient to enable

the little whale yet to catch by filtration out of the sea, the shrimps and other insects on which the animal in a more advanced stage is dependent for its nourishment; maternal assistance and protection appeared, therefore, to have been essential for its support.

The muscles about the neck, appropriated to the movements of the jaws, formed a bed, if extended, of nearly 5 feet broad, and a foot thick. The central part of the diaphragm was 2 inches in thickness. The two principal arteries in the neck (the carotid) were so large, as to admit a man's hand and arm.

The brain lies in a small cavity in the upper and back part of the skull. The cavity included within the *pia mater*, exclusive of the foramen magnum, measured only 8 inches by 5. The upper part of the brain lies very near the surface of the skull. The convolutions of the cortical substance lie in beautiful fringed folds, attached to the medullary portion, which is white, as in the human brain. The general appearance of the brain is not unlike that of other mammalia; but its smallness is remarkable. The quantity of brain in a human subject of 140 or 160 pounds weight, is, according to Haller, 4 pounds;—in this whale of 11,200 pounds, or seventy times the weight of a man, the brain was only 3 pounds 12 ounces.

According to Cuvier, the brain in man varies from one thirty-first to one twenty-second part of his weight*; whereas in this animal, the proportion of brain was only a three-thousandth part.

The heart, which is of an oblong form, much compressed, resembles in colour and substance the heart of an ox. The breadth of it, in this specimen, was 29 inches, the height 12, the thickness 9, and the weight of it 64 pounds. Diameter of the aorta about 6 inches.

Large as the whale is in bulk, the throat is but narrow. In this animal, the diameter of the œsophagus, when fully distended, was scarcely $2\frac{1}{2}$ inches; with difficulty admitting my hand.

The epiglottis is a beautiful valve, formed almost like the termination of the proboscis of an elephant. Though the larynx in the whale has a free communication with the mouth, as in quadrupeds, yet the mysticetus does not appear to have any voice. In other cetacea, however, this is not always the case; some of the Dolphins, in particular, having been heard to emit a shrill

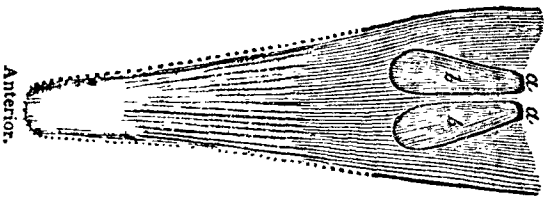
* Leçons d'Anat. Comp. ii. p. 149. The proportion the human brain bears to the weight of the body, appears to be less on an average, than is stated by Cuvier. According to Haller, the proportion in a man of 160 lb. weight, is 1-40th; in a man of 140 lb., 1-35th; and in a child, six years old, 1-22d.

sound, which, in the beluga, may be perceived before the animal arises to the surface of the water*.

The external blowholes or spiracles, were, in the sucking whale, 4 inches in length; in the full grown animal, they form two curved slits, above 10 inches long. In passing downward through the blubber, the blowholes, which at the surface are nearly longitudinal, as in the annexed figure

a, a, twist into a semi-circular and transverse position, in the form of the dotted line *b b*; then penetrating the skull, they proceed backward and downward in two conical parallel canals, until they open near the back of the under-part of the skull, where they inosculate, and form a single membranous sac, within a few inches of the epiglottis. The first impression of each blowhole on the upper part of the skull, is marked by an oblong cavity *b b* in the following cut (representing the upper surface of the anterior part of the whale's skull, the skin and fat being removed;)

* Captain PARRY's "Voyage for the Discovery of a North-west Passage," p. 35.



which is the seat of a muscular substance, attached by its anterior extremity to the surface of the skull, and also attached by its posterior and inferior extremity to the interior of the skull, at some depth in the blowing canal *a a*. The part of this muscle that penetrates the bony canal, is of a conical form, the apex downward or within, represented at *b*, in the annexed figure of a vertical section of the skull;

Anterior portion.

so that when this interior portion contracts, the muscular cone *b*, is drawn tight into the orifice, and completely closes the breathing-canal *a a*; while, on the other hand, the action of the external part of the muscle, draws the conical plug forward and upward, and affords a free passage for the air in respiration. This beautiful structure it is, (aided,

perhaps, by the epiglottis), that enables the animal under the immense pressure to which it is sometimes exposed, to exclude the sea-water from its lungs. This pressure, at some depths to which the whale has been known to descend, is upwards of a ton upon every square inch ; yet, so far from the water being forced down the canals or spiracles, the enormous load serves only more effectually to press down and close the valves, that defend the passages to the lungs.

The whale has no external ear ; and the opening of the passage to this organ is so small, as not to be easily discovered. In the sucking whale, it was only one-sixth of an inch in diameter. An elegant contrivance appears in the meatus auditorius externus, for protecting the ear against pressure from without. It consists of a little plug, like the end of the finger, inserted in a corresponding cavity in the midst of the canal, by a slight motion of which the opening can either be effectually shut, for the exclusion of the sea-water, or unclosed for the admission of sound.

In the sucking-whale, the skull or crown-bone was six feet in length, from the anterior extremity to the condyles. In a full grown animal, in which the whalebone was 10 feet 4 inches, the length of the skull, measured along the upper and convex side of the curve, was 20 feet 8 in-

ches: the cavity on the crown of the same, occupied by the muscular valves of the blowholes, was 14 inches wide and 24 inches long.

The whale being very nearly of the same specific gravity as sea-water (some few individuals sinking, and others barely floating when dead), the weight may be calculated with considerable precision. The body of the whale may be divided into three segments, forming tolerably regular geometric solids. First; the *head*, a parabolic conoid, which, in the sucking-whale, is 4 feet in diameter, and $5\frac{1}{2}$ feet in height; its solid content about $34\frac{1}{2}$ cubic feet. Secondly; the middle segment, extending from the head to the thickest part of the body: this is a frustum of a cone, in the sucking-whale, 3 feet in length, and 4 to 5 feet in diameter, producing a solid content of 48 cubic feet. Thirdly; the posterior segment, extending from the greatest circumference to the tail: this segment is a paraboloid, or parabolic conoid, with its smaller end truncated. Its length in the sucking-whale is 8 feet; its diameters 1 and 5 feet; and its solid content $81\frac{1}{2}$ cubic feet. And, to these products may be added about 10 cubic feet, the estimated bulk of the fins and tail, which make an amount of 174 cubic feet: this sum, divided by 35, the number of cubic feet of sea-water in the Greenland ocean, in a ton weight, gives

the weight of the animal 5 tons within a cubic foot.

One of the largest mysticete, of 60 feet in length,—the head 20 feet in length, by 12 feet in diameter,—the middle section 6 feet by 13 diameter,—the third section 26 feet in length, by 12 and 2 feet diameter, will appear, (if calculated the same way, with an allowance of five tons for the fins and tail,) to be of the prodigious weight of 114 tons! But as the last section is somewhat more slender than the body to which it is referred, this calculation may be a little in excess. The largest animals of this species may, however, I conceive, be safely stated at a hundred tons in weight; and an ordinary full grown animal, at seventy tons!

The most useful and ennobling view of natural history is unquestionably that which gives us the most exalted conceptions of the wisdom, goodness, and power of the Creator. And the branch of this science, that is in the highest degree calculated to assist us in tracing "the works of Nature up to Nature's GOD," is probably the physiology of animals. In every genus of animals, we discover peculiar marks of adaptation for their economy or mode of life; and an endless variety of inimitable contrivances for accomplishing this adaptation.

The whale, which is a mammiferous animal, and

closely allied, in its anatomical structure, to the class of quadrupeds, affords, in the modifications of the parts and principles of land animals, for applying them to a tribe inhabiting the sea, a great number of those striking displays of wisdom and power, the very contemplation of which, is calculated to elevate, in no inconsiderable degree, our conceptions of the Great Supreme. The mysticetus feeds on the smallest insects;—its capacious mouth, with the two vast fringes of whalebone, which is a most admirable filter, enables it to receive some tuns of water at a mouthful, and to separate every substance from it, of the size of a pin's head, and upwards. The physalis feeds on herrings, mackrel, and other fishes of a similar kind;—its whalebone, therefore, is shorter, stronger, and less compact than that of the mysticetus, and the filter formed by it less perfect.

As the whale must rise to the surface of the sea to breathe, its tail is placed horizontally, to enable it to ascend and descend more quickly; and its nostrils or blowholes, instead of being placed at the snout, are generally on the most elevated part of the head, that they may be readily lifted clear of the water.

When the whale descends to the depths of the ocean, it becomes exposed to an enormous pressure from the superincumbent water. This pressure is sufficient to force the water through the

pores of the hardest wood; yet it is effectually resisted by the skin of the whale, though it is remarkably soft and flexible. To exclude the water from the lungs, which would occasion suffocation, if admitted, the blowholes are defended by the peculiar valves that have been already described.

The variety discovered in the structure of the valves of the blowholes of whales, is by no means one of the least interesting parts of their physiology. In other classes of animals, whose habits are similar, we often find, that each organ is the same as the corresponding one, in almost all the species of the same genus, or even of the same order; excepting when their peculiar habits, or necessities, require a modification of the general structure or principle. But in whales, as if it were intended, not only to exhibit the matchless wisdom of the Creator, but, to show that his resources are unlimited, the structure of the breathing canals is varied in the different genera of cetaceous animals, and a number of contrivances, alike extraordinary, equally beautiful, and equally efficient, are adopted for performing the same office.

In the afternoon of the 15th, the continuance of the fog preventing our cruising in search of whales, we made the ship fast to a heavy lump of ice, for the purpose of repairing the damage sus-

tained by the rudder, in the night of the 24th of June. The rudder, on being unshipped and hoisted upon deck, was found to be greatly twisted and bruised; one piece of timber in it broken, most of the braces bent, and some of them nearly torn off. Having fortunately an armourer, with a forge, on board, and also three carpenters, the rudder was put into excellent order; and this important machine repaired and replaced in the course of the night.

Some of the ship's company were employed, during our detention here, in procuring water from the surface of the piece of ice to which we were moored. It formed pools of considerable extent; the produce of melted snow.

During the preceding twenty days, the greater part of the time (nearly three-fourths) was foggy. In consequence of this bewildering obscurity, we were seldom able to cruise to any distance, and only saw two or three whales for the last thirteen days of this interval. Yet tedious as this continuance of fog was, I have often observed it still more obscure and constant, at a greater distance from the land.

In the year 1817, in the 76th parallel of latitude, and between the fifth and tenth degrees of west longitude, among open ice, we had a fog which never once cleared away for fifteen days, and very seldom permitted us to see the distance

of a mile. And in 1821, from the 11th of July until the 21st of August, an interval of forty-one days, we only had three entire days that were free from fog. During this interval, we navigated a sea generally embarrassed with ice, included between the 76th and 67th parallels of latitude, and between the 3d and 15th degrees of west longitude.

This extraordinary prevalence of foggy weather in the polar seas, during the summer months, is a fact which, though well known, has not, that I am aware of, been explained. The fogs to which the icy seas are subject, frequently rest on the surface of the water, and extend only perhaps to the height of 150 to 200 feet, the sky, in the zenith, being often perfectly clear, while objects near the horizon, or surface of the sea, cannot be discerned at the distance of 150 yards. In considering this circumstance, it occurred to me, that the cause of these low fogs was probably a difference of temperature between the upper and lower parts of the foggy stratum; the cold, during such fogs, being perhaps greater at the surface than at considerable elevations. The inverse of this, indeed, is generally found to occur before the foggy season sets in, the temperature, on the average of a great number of observations, having been found to be two or three degrees lower at

the height of the mast-head, than on the level of a ship's deck. But this seems to be only the case while the thermometer continues below the freezing point; for the foggy season generally sets in as soon as a thawing temperature occurs, with any degree of prevalence. One set of observations made during a thick fog, with a bright sunshine and clear sky aloft, were in confirmation of the opinion suggested above. The temperature about 11 A. M., at the mast-head, 100 feet above the level of the sea, was 35°; on the level of the deck, by the same thermometer, $33\frac{3}{4}°$; near the water's edge 34°; and of the water at the surface 34°. The ice, at the same time, must have been, at the highest, 32 degrees. Hence, it would appear, that the fog is generally occasioned by the damp air, near the level of the sea, being chilled by contact with, or radiation from, the ice, which occasions a condensation of that proportion of moisture, which the diminished temperature prevents the air from retaining.

About 11 A. M. of the 16th, the fog dispersed. The sky immediately became quite clear, the sun shone with cheering brightness, and formed a most striking contrast to the uncongenial and bewildering gloom that had so long prevailed.

Not seeing any whales, we proceeded under a smart breeze from the south-west, all the after-

noon and night towards the north, the sea all the way being tolerably open. About mid-night we fell in with a large field, along the edge of which we coasted for six or eight hours, and accomplished a distance of thirty or forty miles. This field could not be less than thirty miles in diameter, and probably contained a surface of 700 or 800 square miles in a single sheet!

We were now in latitude 72° 33′ by meridian observation, and longitude 19° 8′ 45″ W. by chronometer. The land was in sight from NNE. (compass bearing) to NW by W., which filled up the interval not before seen, and enabled me to determine the general position and trending of the coast, from latitude 75° down to 70°.

The ice, from hence, towards the land, being very compact, and apparently impervious, we were obliged to proceed on a more easterly course: still meeting with no whales (with the exception of one that only appeared for a few moments), we made a stretch of about fifty miles due east, passing innumerable sheets of ice, which, however, were so well separated in this direction, that they afforded us a very good passage.

In the evening we fell in with a fleet of about twenty ships, that, like us, had been unsuccessful in their search for whales. As we had seen but three fish during three weeks, after leaving

the latitude of 71°, I thought it advisable to take advantage of a favourable change of wind, and return to that parallel. We accordingly bore away to the south-westward, so as to keep a more eastern meridian than that on which we ascended towards the north. Four ships followed our example, a considerable number proceeded on a more westerly course, while the remainder hove to, apparently for the want of a determination.

The next day, July 18th, we accomplished a distance of about 100 miles towards the SW. and W. The land was not seen, though the weather was perfectly clear, until the evening, when the tops of the mountains appeared above the refracted ice.

As soon as the fog had cleared away, on the 16th, the influence of the sun that was then most powerful, soon began to produce a rapid evaporation from the surface of the sea and ice,—this gave rise to the optical phenomena of unequal refraction, which continued to operate with ever varying effect, for sixty or seventy hours. At one period (about 10 P. M. of the 16th) the phenomenon was so universal, that the space in which the ship navigated seemed to be one vast circular area, bounded by a mural precipice, of great elevation, of basaltic ice. In some places, where water, instead of ice, was seen through the refracting me-

dium, the cliff it seemed to constitute had the colour and appearance of real basaltic columns; and where both water and ice were refracted, the specks and patches of ice had sometimes so much of the character and appearance of land, that one of my principal officers, who was familiar with the general phenomena, was deceived by it. Sometimes the effect of the refraction was similar in all quarters; at others it presented various striking differences. Often the hummocky parts of the horizon were reared into various architectural figures of extraordinary elevation: and occasionally, as observed in a former instance, the whole distant margin of ice was deeply serrated, in resemblance of an innumerable collection of spires and pinnacles, or in the form of a thick forest of naked trees.

In the evening of the 18th, a great number of ships (to the amount of about thirty) being in sight, several novelties, with regard to their refracted appearance occurred, together with some peculiarities in the form and character of the land. On the preceding day, as well as on the 9th of July, when the atmosphere was in a similar state, the refracted forms of the ships were generally indistinct, and somewhat confused; but this evening, about 9 P. M., the refracted ships, with their repeated images, were most beautifully and dis-

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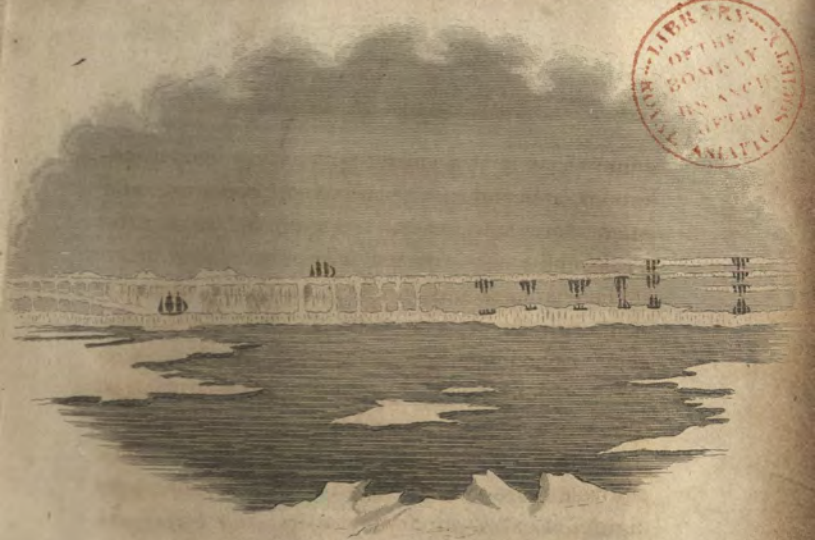

Fig. 1. - July 18th

Fig. 2. - July 24th

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tinctly defined, and especially the latter, which appeared as usual, in an inverted position in the air. (Plate V. Fig. 1.) Of some vessels, whose hulls were beyond the horizon, there were two, and of one ship three, distinct inverted images, each exhibited in a different stratum of refracted ice, one above another,—the lowest image being at an altitude of more than the apparent height of the ship's mast, above the mast-head of the original. And of two vessels there were well defined images, in an inverted position, though the ships to which they referred were not within sight! It should be observed, that the inverted images were visible on this occasion, only, when an appearance of ice, produced either by reflection or refraction, occurred above the regular line of the horizon, in the quarter occupied by the ships: in the clear intervals of the lower atmosphere between the strata of refracted ice no image was seen; and when the stratum was too narrow to comprise the whole of the image, a part of it only appeared. And it should be also observed, that these phenomena were principally telescopic, both the ships and images being so distant, that, to the naked eye, they only appeared as indistinct specks. The inverted images occurred either in the south-west, or north-east quarter; but at the same time, the ships in the north-west quarter were only sub-

ject to a distortive influence;—these appeared above a cliff of ice, elevated by refraction, like oblong black streaks, lengthened out, but compressed almost to the breadth of a line.

The land also exhibited some curious appearances. In many places there were patches resembling two obtuse pyramids united by their apices, the upper one, though quite as distinct as the other, being evidently the inverted image only of the lower one. In occasional positions, where two of these double pyramids were near together, the upper limbs of the higher pyramids coalesced, so as to present the appearance of prodigious bridges, some leagues in extent, with a clear atmosphere beneath them. Sometimes these pyramids were so compressed and multiplied, that three or four were seen in a vertical series, forming so many distinct horizontal strata, joining in the middle, but all detached at the extremities.

The general telescopic appearance of these coasts, when under the influence of unequal refraction, is frequently that of an extensive ancient city, abounding with the ruins of castles, obelisks, churches, and monuments, with other large and conspicuous buildings. Some of the hills often appear to be surmounted with turrets, battlements, spires, and pinnacles; while others, subjected to another kind of refraction, exhibit large masses of rock, ap-

parently suspended in the air, at a considerable elevation above the actual termination of the mountains to which they refer. The whole exhibition is frequently a grand and interesting phantasmagoria. Scarcely is the appearance of any object fully examined and determined, before it changes into something else. It is, perhaps, alternately a castle, a cathedral, or an obelisk: then expanding and coalescing with the adjoining mountains, it unites the intermediate valleys, though they may be miles in width, by a bridge of a single arch of the most magnificent appearance.

The cause of these phenomena, as far as they depend on refraction, is, I imagine, the rapid evaporation which takes place in a hot sun, from the surface of the sea; and the unequal density occasioned by partial condensations, when the moist air becomes chilled, by passing over considerable surfaces of ice. The vapour produced by evaporation and partial condensation, is sometimes perceptible to the eye, rising like transparent steam in all directions, in little curling clouds, and passing along with the breeze near the surface of the sea. Its influence can sometimes be perceived at the distance of a few fathoms, or, perhaps, half a furlong, by the tremulous motion it appears to give to all bodies on the water or near it. In this case, it has a tendency to produce a serrated or basaltic appearance

of the ice on the horizon, similar to what occurred on the 10th and 19th of June. But at other times, when repeated, well-defined and proportionate images of ships appear in the air, the vapour giving rise to the unequal density, obtains more of a stratified arrangement. In its *distortive* effect, it seems to act like clear glass, of unequal surface or thickness; consequently it disfigures all objects seen through it. In its *looming* effect, or that property of it by which bodies on the horizon, or beyond, appear to be greatly elevated, or suspended, as it were, in air, it seems to act by that kind of refraction common to other mediums, when the density about the object seen is greater than at the eye of the observer. The lesser density of the air about the observer, arises from the elevated position he occupies when at the mast-head, where the phenomena are always the most striking. Hence, while near objects, which are seen through a very rare portion of this vapour, are little or nothing elevated; bodies at the distance of the horizon, which are seen through a mass of it several miles in thickness, are elevated ten, fifteen, twenty, or even thirty minutes of altitude. And when ships or ice within a few furlongs distance are disfigured by the action of this vapour, so as to present a varying and tremulous outline; other similar objects, at the distance of several miles,

are, perhaps, steadily elevated. In most cases, the refracted portion of the distant ice is closely connected with the ice of the horizon, from whence it takes its rise; and when it assumes the columnar form, it presents the appearance of a vast amphitheatre, which is so disposed, that every observer, whatever may be his position, imagines himself to be in the centre of it. But in some instances, and these not unfrequent, the stratum of refracted ice is completely detached from the horizon, and appears to form a white horizontal streak in the lower part of the atmosphere. And occasionally, multiplied images of the ice, as well as other objects, occur, forming a parallel vertical series. According to the laws of optics, were the vapour universally distributed, and of regular density, there might be an elevation of the distant objects, which would be equal and uniform; but there could be no extraordinary rearing of some, with the distortion of others, such as I have had occasion to describe: these phenomena, therefore, must be owing to unequal and changeable density; and some of them, such as the repetition of images, to alternations of parallel strata of different densities, in the medium through which the refracted objects are seen *.

* Dr Wollaston, with his usual ingenuity and precision, suggests an explanation of the ordinary phenomena of

There was an anomaly in these optical phenomena, with regard to the land, which was, for a

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this order (such as the exhibition of one erect and one inverted image of distant objects, under the influence of unusual atmospheric refraction, &c.), which may, perhaps, be extended to the illustration of the more complicated phenomena. This explanation refers to the peculiar refractive effects of media of various densities, when brought into contact, or united by mutual penetration; and is satisfactorily and beautifully illustrated, by experiments with liquids of different specific gravities, and air of different densities. The first mode of illustration was accomplished, by putting a small quantity of clear syrup into a square phial, and carefully pouring on the top of it an equal quantity of water; small objects seen through the incorporated medium (namely, through that part of the phial where the syrup and the water had slightly combined), appeared inverted with an erect image above. A similar experiment with water and spirit of wine above it, gave similar results; but when the object examined was placed nearer to the rarer medium (the spirit of wine), the inverted and erect images were seen below. Analogous effects were also observed, by looking along the side of a red-hot poker, at a paper ten or twelve feet distant. (Philos. Trans. for 1810.)

Another ingenious illustration of these phenomena was contrived by Dr Brewster. His very satisfactory experiment "consists in holding a heated iron above a mass of water, bounded by parallel plates of glass. As the heat descends through the fluid, we have a regular variation of density, which gradually increases from the surface to the bottom. If we now withdraw the heated iron, and substitute a cold body in its place, or even allow the air to act alone, the su-

long time, a great difficulty with me. At the very moment when the ice and other objects about the horizon were evidently raised several minutes of altitude, by being seen through the highly refractive medium, the effect of which has been so fully stated, the upper parts of the land were sometimes totally unaffected by it, remaining at their proper level, while the lower parts were intercepted by so much, as the horizon seemed to be elevated above its real position. As such, it appeared, that the influence which caused the looming of the ice, by some peculiarity or other, did not extend to the land. It seemed to intimate, either that the looming of the ice was owing to reflection rather than refraction, or, that the tops of the mountains were above the vapour, and my position at the mast-head (the place from whence most of my observations were made) also above it, so that no influence could be ex-

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perficial strata of water will give out their heat, so as to have an increase of density from the surface to a certain depth below it." Through the medium thus constituted, many of the phenomena of unusual refraction may be seen in the most beautiful and satisfactory manner, though the difference of density in the medium employed, is only that produced by the agency of heat alone. (See Edinburgh Encyclopædia, article *Heat*, vol. x. p. 675.; and a valuable treatise on Optics, in the same work, vol. xv. p. 617.—620.)

erted by the refractive medium, but on the base of the land, which was concealed by the looming of the ice.

That the latter opinion is the correct solution of this anomaly, further experience seemed fully to prove. On the 19th of July, while the atmosphere continued in this state, we sailed towards the land the whole of the day. During the greater part of our progress, the refracted ice constantly intercepted the lower part of the coast, to an altitude of twenty minutes or more; while the tops of the mountains, from the middle upwards, were clearly seen: but when we came so near the shore, that the refracted ice disappeared, the land acquired an additional altitude, as measured from the apparent horizon, just equal to the portion that the ice had been elevated by the refraction.

As the more extraordinary and beautiful effects of unequal refraction cannot be fully discovered, without the use of a telescope, they escape general observation; and as the looming of the distant ice, or distortion of objects, is the most common effect of this state of the atmosphere, it becomes a considerable annoyance to persons not interested in the phenomena. As in this case, the vapour gives an indefinite and tremulous outline to every object beyond a certain distance;—ships, a mile or two off, cannot be recognised;—a

wall of ice seems to surround the navigator, the openings and leads in which cannot be discerned at a distance;—and, of the actions and employment of remote vessels, within sight, a knowledge of which is often of great importance to the unoccupied fisher, no correct conception can be formed.

CHAPTER VII.

APPROACH THE COAST OF GREENLAND.—SURVEY RESUMED.—SEVERAL ISLANDS DISCOVERED.—HEADLANDS, BAYS, AND ISLANDS NAMED.—EXTRAORDINARY MOUNTAINS.—ICEBERGS.—FIRST LANDING ON THE COAST.—DISCOVER TRACES OF RECENT INHABITATION.—INVERTED IMAGE OF A SHIP SEEN IN THE AIR, RECOGNISED.—LARGE INLET DISCOVERED, AND EXAMINED.—SECOND, THIRD, AND FOURTH LANDING EFFECTED.

Friday, July 19th.—OUR endeavours to find whales at a distance from the land, having, for nearly three weeks, almost altogether failed, I now considered myself to be fully justified, in attempting researches more immediately about the coast. My propensity to enterprise and investigation had long inclined me to try this station; but until the present time, the main design of my voyage (for any deviation from which I was entirely responsible) did not seem to be compatible with my wishes. It was, therefore, with a high excitation of feeling, that I this day directed my attention to the discovery of channels, however intricate, through an intervening barrier of fields and floes;

and it was with much satisfaction that I marked our rapid advance directly towards the land, under favour of a smart breeze and clear weather, until our progress was bounded by a strip of floe-ice, about a couple of leagues in breadth, that was fast frozen to the shore. Although the land was seen quite bold from the deck before we entered the barrier; the passage of it occupied us fifteen or sixteen hours, going three or four knots, directly in-shore. Several ships accompanied us in this navigation; and having reached the "land-ice," turned up along shore, in company with us, towards the south-west, there being a commodious and clear opening between the land-ice and the floes in the offing.

The land-ice consisted of heavy consolidated floes, having embedded in it several icebergs of a larger size than I ever remember to have seen before. These being probably aground, served to stake the whole of this ice firmly to the shore, where it appeared to have remained undisturbed for some years. One of the icebergs, that had an elevated peak at its extremity, was estimated to be 150 feet above the level of the sea; and another that was quite square, with vertical sides, was the height of a ship's mast, or about 100 feet. These icebergs were generally of a white and chalky appearance; some, however, were of a greenish-grey

colour on the sides; and others, having a favourable surface and position, reflected the sun's rays with almost silvery brilliancy.

The place where we fetched in with the land, was at the mouth of a small bay or inlet, in latitude 71° 2′, which was named after Chevalier MASCLET, late French Consul at Liverpool. Close by this bay is a remarkable mountain, that was called CHURCH MOUNT, from its striking resemblance to a church; and two adjoining headlands, separated by Masclet Bay, I named in compliment to two respected clergymen of Liverpool, CAPE JONES and CAPE BUDDICOM. Another headland, a little farther to the southward, received the name of CAPE GREG, out of respect and regard to Mr Samuel Greg of Quarry Bank; and a contiguous inlet, was named after another esteemed friend, HOLLOWAY BAY.

The land at this time in sight was the most extraordinary of any that I had ever before seen; but its more particular description is reserved for the following day.

Several sets of altitudes were taken for the longitude, as we approached the shore; and also observations for the variation, &c. Our latitude, at mid-night, by meridian altitude below the pole, was 71° 0′; and longitude, by chronometer, 21° 15′ W., the nearest land being distant about six miles.

On the 20th, the weather was generally foggy, but it fortunately cleared up near the land, where we were, in the morning, and continued fine until 2 P. M., so that I had sufficient time for making all requisite observations. At 8 A. M. we tacked within four or five miles of the shore, and within a mile of a small island near the edge of the land-ice. Here I took a series of angles, and then standing off a sufficient distance, I took corresponding bearings, and also another set, on again returning to the land-ice. The intersections gave me the position of the most remarkable parts of the coast, within twenty-five miles. At noon, the latitude observed was 70° 44′ 57″ N.; the longitude, by chronometer, 21° 9′ W.; and the variation of the compass 44° 30′ W. Depth of water 155 fathoms.

The land at this time surveyed and projected (including fifteen miles of coast to the southward and twenty-five to the northward) is mountainous, dark, and sterile in the extreme. Nothing can be conceived more rugged than it is; yet nothing that I have ever seen equals it in bold grandeur, and interesting character. There is nothing in it that is tame, smooth, or insignificant. The mountains consist of an innumerable series of elevated peaks, cones, or pyramids, with the most rugged assemblage of sharp rocks jutting from the

sides. They take their rise from the very beach, and ascend by steep and precipitous cliffs. Most generally, they have obtuse or rectangular summits, with equally sloping sides, and acuminated crests; but some of them have acute terminations of a very extraordinary appearance. Most of the summits from latitude 70° 33′, to 71° 12′, are surmounted by ranges of vertical pinnacles, so uniform and parallel, as to resemble ranks of soldiers. These pinnacles, in a mountain in latitude 71° 13′ N., consist of six or seven tall parallel chimneys, increasing progressively in height, and forming a beautiful series; and, although they are probably of the height of near 500 feet above the connected summit of the mountain, they stand singly and detached from each other.

Another mountain, in latitude 71° 4′ (Church Mount) has, at the summit, two vertical towers, with gable-formed tops, closely studded with pinnacles. The height of this mountain was found, by the angle under which it appeared at a known distance, to be 2967 feet. The height of another mountain, which I named *Double Mount*, from its two similar summits, came out, by calculation, 3444 feet. And one of a range of mountains lying between latitude 70° 33′ and 70° 41′, was found to be 3690 feet high. This chain, which, in most parts, has sharp summits, thickly

crested and serrated with pinnacles, was named ROSCOE MOUNTAINS, in compliment to the respected author of the "Life of Lorenzo de Medici." The general height of this coast, I estimated at 3000 feet. Several islands were discovered on the skirts of the coast. These were of a different character, being more rounded and uninteresting in the structure of the rocks, than the land which we considered as the main. One of the southernmost of these, lying in latitude 70° 40′, having an insulated peak jutting into the sea, with a rock on the summit, resembling the ruins of a castle, I named after my esteemed friend Mr WILLIAM RATHBONE; and another island, about half a league to the northward, in compliment to Mr B. A. HEYWOOD. A third island, nearly adjoining the latter, I named SANDBACH ISLAND, after another much respected friend; and a small one intermediate between the two latter, after Mr CHARLES PARKER.

There was very little snow upon this land: the acuteness of the summits of the mountains, indeed, and the steepness of the sides, seem to preclude any considerable lodgment of snow on the coast. Two or three glaciers, or parent icebergs, were here observed: one of them, in latitude 70° 58′, is of very considerable elevation and extent.

On the 21st and 22d of July, the weather was very boisterous and generally foggy. Sometimes we had shelter under the lee of a floe; but having stood into the land-water, during a clear interval, we became exposed to a considerable sea, and spent the night, which was extremely thick with fog, in much perplexity and danger, owing to heavy lumps of ice that were sometimes met with, when we could scarcely see a distance sufficient to enable us to avoid them.

The weather moderated a little on the 23d, on which we made sail, and stood towards the land. As we approached the coast, the density of the fog began to diminish, and at noon we obtained a clear view of the land. At noon we tacked, and hove to close to the land-ice, in latitude 70° 36′, and longitude, by chronometer, 21° 14′ W., which agreed with the observations taken on the 20th, (compared by respective bearings of Rathbone Island), to half a minute. The land-ice was still found to retain its winter's position, being fast glued to the shore, and filling most of the bays along the coast, and channels among the islands. A little to the southward of us, however, water was, for the first time, observed to extend to the very beach. Twelve or fourteen icebergs were visible from hence, several of them near us. Some of them appeared to be at least a hundred feet

above the level of the sea, and four or five hundred feet in diameter. As the depth of water at the ship was only eighty-two fathoms, there was reason to believe that the whole of the icebergs in-shore of us were aground. At this time, we were within three miles of an apparently insular foreland (bearing WNW. true) presenting a precipitous face towards us, of above 2000 feet in elevation. This I named RAFFLES ISLAND, out of respect to the Reverend Dr Raffles of Liverpool.

Another headland, of very similar appearance and steepness, also at the distance of about three miles from us, bearing WSW. (true), was named CAPE HODGSON, after another esteemed friend, and was found to be 2580 feet high.

The coast from latitude 71° 30′ to Cape Hodgson in 70° 32′, trends nearly north and south, true, and is entirely mountainous: to the southward of Cape Hodgson, however, its direction becomes south-westerly, and its elevation gradually diminishes to a low sloping point in 70° 28′, that received the name of CAPE SWAINSON, in compliment to the author of "Zoological Illustrations." Here the land running more westerly, disappeared; but reappeared again with its usual mountainous character, at the distance of about 20 miles to the southward of Cape Swainson.

The clear interval between this cape and the distant land proved to be a wide inlet, penetrating to a great but unknown extent to the westward.

The height of the land near us,—its dark colour, deepened by contrast with a few patches of snow,—its precipitous sides,—sharp and rugged summits,—with the abrupt terminations of the northern parts of Raffles' Island and Cape Hodgson,—gave it a character at once interesting and sublime.

The wind blowing fresh, with a good deal of sea, I could not carry on the survey of the land, by bearings taken at the mast-head. And as no bearings taken about the deck of the ship could be depended on, because of the great "deviation," and its varying quantity on different parts of the deck, I was obliged to take all the required angles by a sextant, and to connect the series with an azimuth of the sun. The angular distance between the sun and Cape Swainson being thus obtained, and the same reduced to the horizontal angle by calculation; this angle was applied to the sun's true azimuth, likewise obtained by calculation, which of course gave the true bearing of Cape Swainson. And by the application of the observed angle between this cape and other headlands, to the position of the cape deduced from the sun's azimuth, the true bearings of these headlands were likewise determined.

A thick fog set in about 4 P.M., and prevented any farther observations on the form and position of the land during the day; and soon afterwards a strong gale arose, which obliged us for safety to stand off to the eastward. In the night, when the obscurity produced by the fog was at the greatest, we got entangled among a quantity of heavy drift-ice, which perplexed us excessively. Escaping from thence, we stood backward and forward in the "land-water," fearful, on the one hand, of running on shore, and on the other of coming in contact with the ice.

Next morning (July 24th), on the wind moderating, we made a stretch to the northwestward. As we approached the land, the fog began to break, and when we arrived within seven or eight miles of the shore, we emerged into a cloudless sky, and bright sunshine. An extraordinary quantity of ice that had formed in the rigging during the morning of this day, was soon dislodged by the warmth of the sun. It fell in large transparent rods, several pounds in weight, and cut the faces of some of the men who were so imprudent as to look upward.

Being anxious to land upon a coast, on which no navigator (a whale-fisher or two perhaps excepted) had ever set foot, I thought this a favourable opportunity for gratifying my curiosity. This

curiosity was heightened almost to the utmost pitch, by the historical recollections of the Icelandic colonies that had at a remote period been planted a few degrees to the southward, upon the same line of coast,—and particularly by the hope which I could not avoid indulging, that I might be able to discover some traces of those hardy people, the fate of whom, for near four centuries, has been a problem of such intense and almost universal interest. An additional interest attached to the investigation of this country (if the interest excited by the above considerations were capable of augmentation), was the circumstance of the singular and total failure of the many attempts of the Danes to reach this coast, for the recovery of the ancient colonies,—together with the peculiar enjoyment that necessarily arose out of the conviction, that the shore on which I designed to land was entirely unknown to Europeans, and totally unexplored.

As we stood in, I obtained several series of bearings of headlands, &c. with altitudes of the sun for the longitude, designed for the extension of my survey. Finding the coast bold, we reached within three quarters of a mile of the beach, where we had soundings in 25 fathoms: the weather being then extremely fine, and highly favourable for my purpose, I took a boat at 5½ P.M. and proceeded to the shore. I landed in fifteen

minutes on a rocky point, named CAPE LISTER, after a reverend friend, lying in latitude 70° 30′, and longitude 21° 30′ W. The coast here having changed its mountainous character, and become more level towards the south and west, we were enabled to reach the top of the cliff, which was only 300 or 400 feet high, and to travel along its brow to the westward. The rocks we ascended consisted chiefly of hornblende, in sharp, angular, irregular masses, much broken, with some of the same rock, of the slaty kind, containing much mica, and veins of feldspar. The brow of the cliff, instead of soil and verdure, presented either a naked or lichen-clad pavement of loose angular stones. Most of these, consisting principally of white quartz, with intermixed masses of sienite and hornblende-rock, had suffered so little from exposure to the atmosphere for numerous ages, excepting as to fracture, that their angles were as sharp as if they had been newly broken. Bordering the sea, these stones were almost enveloped in a covering of black lichens; but on ascending over a sheet of snow to a superior eminence, the lichens became much less abundant. The almost total want of soil was an effectual preventive to verdure; the vegetation was therefore confined to a few hardy lichens, with an occasional tuft of the Andromeda tetragona, Saxifraga oppositifo-

lia, Papaver nudicaule, and Ranunculus nivalis.

Sending the boat along shore, I traced the hill towards the west for three or four miles, passing over a continued surface of loose stones, or over beds of ice and snow, and then descended near Cape Swainson, towards the beach, consisting here of a strip of flat strand, about a furlong in breadth. Here, the first interesting object was discovered, consisting of a circle of stones, so artificially placed, that there could be no doubt but it was the work of man; and soon afterwards other appearances of manual arrangement were met with. These were the remains of habitations, consisting of two circular walls, or in some places merely of rows of stones, inclosing a clear area of about five yards in diameter, laid out exactly in the manner in which the Esquimaux prepare the ground for their summer huts. Besides these, there were several hollow tumuli, neatly arched in the form of a bee-hive, with an opening either at the top or on one side. These resembled the stores wherein the Esquimaux are known to deposit the produce of their fishing or hunting, when too considerable for present use. They varied in size from $2\frac{1}{2}$ to $4\frac{1}{2}$ feet, interior diameter. The principal part of these remains occurred on the west side of Cape Swainson, where also

some other still more striking evidences of recent inhabitation were found. These consisted of two cavities, inclosed by stones, on the edge of a bank, that had been employed as fire-places, and in which were the remains of the fuel that had been used in them, consisting of charred drift wood, with half-burnt moss, and a quantity of ashes. The latter, being of so light a nature as to be liable to be carried away by the melting of snow about them, impressed me with the opinion, that they had not been here during the preceding winter, but that the persons who used these simple contrivances for fire-places, must have been on the spot even in the present summer. As there were no permanent residences to be found, this place appeared to have been either resorted to as a summer fishing-station by some of the natives, or touched at, in their excursions along the coast. In addition to these evidences of the present existence of inhabitants, we met with several pieces of bone and wood, which had undergone artificial fabrication; and also the head of an arrow or small dart, rather neatly made of bone, armed with a small piece of iron. It is difficult to say whether this iron was native, or whether it was carried on shore in the timbers of some wreck. The manufacture was a good deal similar to that of the iron implements of the Arctic Highlanders, discovered by

Captain Ross; and it is not improbable but it had a similar origin. The state and situation in which it was found, indicated that it had not been long out of use. It was found lying in a little cavity of the rock, where we first landed, in a pool of sea-water; yet it was not greatly corroded by rust. On the contrary, it was so little acted upon, that it did not seem to have lain many months.

Scarcely any birds were seen on the shore, though there were abundance of roaches, dovecas, and some eider-ducks in the water. I only observed an arctic gull, and two small birds (one resembling a wag-tail and the other a red-pole) during the whole excursion. Numbers of winged insects, however, were met with, particularly on the hills among the stones. These consisted of several species of butterflies, with bees, and musquitoes! Near the beach were several plants in flower, with a few that were farther advanced, and in a state of fructification. I obtained beautiful specimens of Ranunculus nivalis and Andromeda tetragona, two or three species of Saxifraga, Epilobium latifolium, Potentilla verna, &c. with the Cochlearia anglica, Rumex digynus, and a species of Salix. The latter was the only arborous plant met with. This willow expands to the extent of three or four feet, or more,

and grows to the thickness of the little finger; yet so is it accommodated to the nature of the climate, that it only spreads laterally, never being observed to rise higher than two or three inches above the ground.

No other object of interest was observed, excepting some horns of rein-deer, and the bones of these or other animals; most of the bones were found about the site of the tents and huts, or in the tumuli adjoining. No sea-weed was seen on the beach, nor any shells; but in deep water, near the shore, both these productions were observed.

There was a considerable tide: it seemed to have ebbed while we were on shore, but the period of high-water was not determined.

On my return to the ship, about 11 o'clock, the night was beautifully fine, and the air quite mild. The atmosphere, in consequence of the warmth, being in a highly refractive state, a great many curious appearances were presented by the land and icebergs. The most extraordinary effect of this state of the atmosphere, however, was the distinct inverted image of a ship in the clear sky, over the middle of the large bay or inlet before mentioned,—the ship itself being entirely beyond the horizon. Appearances of this kind I have before noticed, but the peculiarities of this were,—the perfection of the image, and the great dis-

tance of the vessel that it represented. It was so extremely well defined, that when examined with a telescope by Dollond, I could distinguish every sail, the general "rig of the ship," and its particular character; insomuch that I confidently pronounced it to be my Father's ship, the Fame, which it afterwards proved to be;—though, on comparing notes with my Father, I found that our relative position at the time gave our distance from one another very nearly thirty miles, being about seventeen miles beyond the horizon, and some leagues beyond the limit of direct vision. (Plate V. fig. 2.) I was so struck by the peculiarity of the circumstance, that I mentioned it to the officer of the watch, stating my full conviction that the Fame was then cruizing in the neighbouring inlet.

July 25th.—In the course of the night, having occasionally a light breeze of wind, we stood to the westward, into the entrance of the spacious inlet that was first seen on the 23d. At six in the morning, we were almost in the middle of the entrance, in which situation we had a clear view of the interior of the inlet. Towards the west (true) no land was in sight. From Cape Swainson, the northern coast trends WSW. (true), to another low point about six miles distant, that was named CAPE TOBIN, in compliment to Sir John Tobin of Liverpool. This is

the southernmost headland of the coast recently surveyed; beyond which it runs more northerly. About five leagues to the westward (true) of this cape, a new coast appears, which being rather low land, of a smooth surface, and regular brown colour, has a totally different character from the adjoining country. It received the name of JAMESON'S LAND, in token of friendship to Professor Jameson, the highly respected President of the Wernerian Society.

The coast on the southern side of the great inlet is entirely mountainous. It is terminated to the eastward by a bold narrow promontory, which I named CAPE BREWSTER, in compliment to another much esteemed friend, the Secretary to the Royal Society of Edinburgh. From Cape Brewster, the land runs nearly due west, for about twenty miles, and then about WNW. to a still greater distance.

Cape Brewster was surrounded by thin land-floes, thickly studded with icebergs; several dozens of which were at this time visible from the mast-head. This ice extended more than half-way across the mouth of the inlet, from the southern coast; but the northern side was quite clear. We hove to near the edge of the land-floes, about 7 A. M., and remained nearly stationary, until I obtained a series of bearings, and altitudes of the sun for

ascertaining the longitude by chronometer. Just as I finished, the wind died away, when there was found to be a current setting due west at the rate of about half a knot: the influence of this carrying us almost against the ice, we were obliged to lower several boats to tow the ship off. On trying for soundings, there was no bottom with 220 fathoms of line.

With the first breeze of wind that sprung up, we stood to the north-west into the bay, accompanied by three ships that had joined us in the night. We now got sight of the ship, whose image had been seen in the air, and found it to be the very ship I had announced. At noon our latitude was 70° 24′ 42″ by observation; and longitude 22° 10′ W., Cape Brewster bearing S 8° E (true). In the afternoon we had advanced to within four or five miles of the north-western point of the land, connected with Cape Tobin, (which I named CAPE HOPE, from respect to Mr Samuel Hope of Everton), when it was observed, that the channel separating this coast from Jameson's Land was about five miles in breadth, at the entrance, where it is the narrowest, and that it extends due north, without any visible termination. This extensive channel was named HURRY'S INLET, out of respect to Mr Nicholas Hurry, managing-owner of the Baffin.

The weather being still fine, and the ship almost becalmed, I had an opportunity of landing at Cape Hope, where I took a series of angles and bearings, for the advancement of my survey. The result of my observations on the appearance and products of this station, will be found embodied with the description of the main-inlet, and account of other visits to the shore. On my return to the ship, I took occasion to call on board of the Fame, which was now not very distant from the Baffin, when I was informed by my Father, that he had seen two whales in this inlet (where he had already cruized for two or three days);—and that his boats had explored Hurry's Inlet, though without success, to an extent of thirty or forty miles towards the north; and also the inlet to the westward of Jameson's Land, to an almost equal distance from his ship.

July 26th.—Two whales having been seen in the night, I was encouraged to prolong my stay here, which afforded me another opportunity of visiting the shore, in a more interesting spot than formerly, on the east side of Jameson's Land. The place I selected for landing upon was CAPE STEWART, so called after Professor Dugald Stewart, which lies nearly in the same parallel as Cape Hope, directly across the mouth of Hurry's Inlet. Not only its appearance, but its structure,

is totally different from any of the surrounding country that I had an opportunity of visiting,—the whole of these being primitive formations, whilst on Jameson's Land, as far as examined, no primitive rocks were found, but only such rocks as belong to the series of the coal formation.

The latitude this day was 70° 25′; longitude 22° 21′ 45″ W.

Not having met with a sufficient number of whales to tempt us to remain in this inlet, we began to beat out of it with the first breeze, which set in from the south-east. At midnight (26th,–27th) we stood close in with the southern shore, which was here clear of ice, and sent a boat towards a creek, about five miles to the westward of Cape Brewster, for the purpose of collecting specimens of the vegetable and mineral productions. The party sent on this excursion, ascended one of the mountains until they got a view of the sea to the southward, and traced the coast along, almost up to Cape Brewster: they remained on shore all night, and returned about ten in the morning. I was much disappointed in the result of this expedition; for although the officer who had the charge of the party, had accompanied me on a former excursion, and had witnessed the manner of collecting specimens, yet he contented himself with gathering a few pieces of calcedony, and

other loose stones, the whole of which were carried in a small pocket handkerchief, and scarcely exceeded a handful. On being reproved for neglecting to bring me specimens of the rocks, he excused himself, by stating, that he thought them useless, as they were exactly the same (in his opinion) as those I had collected on Jameson's Land.

To compensate for the deficiencies of this excursion, I was preparing to undertake the examination of the rocks myself, when a gale of wind, at south-east, suddenly commenced, and blew with considerable violence, for an hour or two, directly into the bay: it then began to subside, but, by this time we had got too far from the southern shore to render a landing convenient. The evening was again fine and moderate. The wind veering to the south-west, we were enabled to lead out of the inlet. At 8 P. M. we were in a line between Cape Brewster and Cape Tobin, where we hove to until the Fame, which was in company, sounded; the depth of water was 310 fathoms.

My researches in this interesting inlet being now brought to a close, I shall, before taking leave of it, give, in a separate chapter, the result of such observations as my limited stay and opportunities permitted me to make.

CHAPTER VIII.

LARGE INLET NAMED AFTER CAPTAIN SCORESBY, *SENIOR*, *SCORESBY'S SOUND*.—DESCRIPTION OF ITS DIFFERENT RAMIFICATIONS.—HALL'S INLET.—HURRY'S INLET.—RESEARCHES AT CAPE HOPE AND ON JAMESON'S LAND.—DESERTED HAMLET.—ESQUIMAUX REMAINS.—CAPE BREWSTER.—PECULIAR TIDES AND CURRENTS.—GREAT DEPTH OF WATER.

VERY little assistance was hitherto afforded me by any individual, in the investigation of these regions; but where any valuable information had been received, I considered it incumbent on me to compliment the person, whose researches had been useful to me, by applying his name to the portion of land, or sea, respecting which he had supplied the information. Agreeable to this practice, I could not, without evident injustice, overlook the very important researches of my Father in this inlet,—who not only was, I had reason to believe, the original discoverer of it, but who was the first navigator who entered it, and determined its general position, and who, with a peculiar perseverance, sent his boats and examined two of its

extensive ramifications, to a distance of sixty miles from the extreme capes, or entrance of the inlet. As such, after some scruples of delicacy, lest it should be considered as bordering on self-compliment, I ventured to name this capacious inlet, in honour of my Father, SCORESBY'S SOUND *.

The extreme headlands, which may be considered as forming the entrance of Scoresby's Sound, are Cape Hodgson on the north, and Cape Brewster on the south, which lie about twenty-four miles apart, in a direction SW b S., true. But between Cape Brewster and Cape Tobin, that lie nearly in the same meridian, the width diminishes to about fourteen miles, beyond which the Sound again expands. From Cape Tobin, on the north side, where the land declines to the beach, the coast trends WNW. (true) to Cape Hope, and from thence, by a low regular shore, towards the north, in a direction parallel to the eastern coast, thus giving the land a peninsular form, with the appearance of an island. To the southern and

* The term Sound, by the British, is generally applied to channels between islands, or to passages between islands and the main-land; but in the north of Europe, and in the coasts of Baffin's Bay, as also in those of Spitzbergen, &c., this term is given (and I conceive with considerable propriety) to any apparently interminable arm of the sea. I have, therefore, adopted it in the naming of this inlet.

eastern sides of this tract of land, I gave the name of THE LIVERPOOL COAST, because of its headlands and islands having been chiefly named after Liverpool friends. The western part of this is washed by Hurry's Inlet, which separates it from Jameson's Land. My Father had boats between thirty and forty miles up this inlet, without finding a termination. They found the general width of the inlet from two to three leagues; and, near the extremity of their excursion, discovered three islands which were called, after my Father's ship, FAME ISLANDS. Two prominences in this inlet, received the names of GIBSON'S POINT, and PHILLIPS' POINT, after two of my partners in the Baffin; and a third, LLOYD'S POINT, after the captain of the Trafalgar (one of the ships in company) who made some useful investigations about this inlet.

The eastern coast of Jameson's Land, which generally lies north and south, true, trends towards the south-west, below Cape Stewart, with a low flat shore, as far as the southern point, that received the name of CAPE HOOKER, after Dr Hooker, Professor of Botany in Glasgow. This coast then winds towards the W., NW., and N., so as to constitute Jameson's Land either into a peninsula or an island. It has indeed every appearance of an island; but no opportunity of de-

termining its complete insularity occurred. About ten leagues north-west, true, from Cape Hooker, a bold promontory was discovered, and named after Captain Ross, the commander of the first of the recent expeditions towards the north-west, and surveyor of Baffin's Bay; but it could not be ascertained whether this cape belonged to Jameson's Land, or to some other distinct region.

From Cape Brewster, the southern coast of Scoresby's Sound was seen to extend W. and WNW., true, for about fifty miles, where the most distant point (which was named after Mr ROBERT STEVENSON, civil-engineer), was observed. The width of the Sound, included between this coast and Jameson's Land, is about fourteen miles, the narrowest part being in the meridian of Cape Hooker. To the westward of this, it expands into a sea, supposed to be twenty-five miles broad, which is divided into two branches by a large and very distant tract of land, lying nearly in the middle, to which I gave the name of MILNE LAND, in compliment to Sir David Milne.

The south-eastern point of Milne Land was named CAPE LESLIE, in compliment to the Professor of Natural Philosophy in the Edinburgh College. Between this headland and Cape Stevenson, the main Sound continues its penetration

to the westward, to an extent that could not be determined, as no land was ever visible in this opening from the Baffin's mast-head, nor could any land be seen in it by my Father's officer, who was sent to explore the Sound to the westward of Cape Hooker.

Another ramification of this Sound runs to the northward or north-westward, between Jameson's Land and Milne Land, which received the name of HALL'S INLET, out of respect to Captain Basil Hall of the Royal Navy. This branch of the Sound was examined by my Father, to an extent of about thirty miles from Cape Hooker, beyond which there appeared an interminable expanse of ice, without any land visible towards the north-west, true. Hall's Inlet, therefore, if we may judge from the general height of the adjoining country, almost any of whose coasts may be seen sixty miles from the deck of a ship, must extend at least seventy miles beyond Cape Hooker, or ninety miles from Cape Brewster. The southern ramification of the Sound being full of ice, precluded all particular examination with the boats; and we could not unfortunately be justified in undertaking any travelling exploration, because, in such, there could be no chance of capturing whales, or in any way promoting the chief designs of the voyage; whereas, in examinations with the boats,

we were fully justified, being always prepared to attack any whale that might chance to appear. The ice that occupied these western inlets, principally consisted of thin sheets or floes, apparently the product of the preceding winter. Such of the ice as yet remained was in a state of rapid dissolution; and, wherever it had been fully exposed to the solar action, it had already disappeared.

Thus in Hurry's Inlet,—which, lying directly north and south, is exposed to the most powerful action of the sun, about the meridian, and also receives an extraordinary influence from the morning and afternoon beams, that are received almost vertically upon its sloping banks,—the whole of the bay-ice had disappeared, no ice whatever having been seen in it for the whole extent of ten or twelve leagues, to which it was examined, excepting an occasional fragment of an iceberg. But, on the other hand, a very large quantity of bay-ice, apparently of interminable extent, still remained on the southern side of the Sound, above Cape Hooker; and particularly in the south-western ramification, because there it was defended, during the height of the day, by the penumbra of the adjoining mountains, whose great elevation, and transverse position, skreened the ice near their bases, from the solar rays.

When we first entered the Sound, there were

some extensive sheets of bay-ice lying about Cape Brewster; but these were in such a rapid state of decay, that, within three days, the whole of the larger sheets were broken into pieces, and great quantities dissolved. There were also several very large icebergs: these, however, defied the immediate action of the sun, and might remain for many years, unless drifted away into a warmer climate. I have intimated, that the southern part of the Liverpool Coast is low land, at the water's edge, from whence it gradually rises to a mountainous height. On this aspect, though it fronts the south, there was yet a considerable quantity of snow, in different patches, principally lying in dells and cavities, in which large masses had been collected during the winter and spring. The western coast of this land, that borders Hurry's Inlet, is more regular than any thing I have seen in Greenland. From the shore, where it is low and almost even with the water's edge, it rises, with an easy slope, to the height of perhaps 1500 or 2000 feet perpendicular; and it is so uniform in its ascent and termination, that it constitutes a level ridge, regularly diminishing, to appearance, by the effect of perspective, until it sinks down to the level of the sea, in the extreme distance. This ridge, which was named PERSPECTIVE RIDGE, from its form and appearance,

was spotted with numerous little patches of snow, but by far the greater proportion of the surface of the ground was bare.

Near the southern extremity of Perspective Ridge, I landed, on the afternoon of the 25th, at Cape Hope. I selected this spot, on account of an irregular rocky point jutting into the sea, which promised to afford something more interesting in the mineralogy, than the adjoining flat shore: but this was not particularly the case, the rocks being entirely primitive, and resembling those at Cape Lister.

Again we discovered traces of inhabitants, in the remains of summer-huts and tumuli, similar to those before observed. We also obtained several fragments of the horns of rein-deer, which had been artificially divided; with human bones, and the bones of dogs, hares, and some other quadruped. The skull of a dog was found in a small grave, which was probably that of a child, as Crantz informs us, in his excellent "History of Greenland," that the Greenlanders lay a dog's head by the grave of a child, considering that, as a dog can find its way every where, it will shew the ignorant babe the way to the land of souls.

There were very few living creatures to be seen excepting insects; scarcely any birds, and no quadrupeds but three white hares *(Lepus glacialis*

of Leach), one of which I shot. It was a young animal, not larger than a rabbit. The eyes were of a brown colour. The fur was extremely fine and soft; the colour entirely white. The flesh was remarkably fair and well flavoured. It proved the most delicious eating of any of the produce of the polar countries I ever tasted. The insects were numerous, consisting of mosquitoes, and several species of butterflies.

The heat among the rocks was most oppressive; so much so, that my excursion was greatly contracted, and my research limited, by the painful languor which the uncommonly high temperature produced. Unfortunately I had no thermometer with me, but I think the temperature could not be below 70°: to my feelings, it was equal to the greatest heat of summer in England. Its effect on the vegetation was indeed so great, that most of the plants met with had already seeded, and some were quite dried and decayed.

Jameson's Land, it has been observed, is of a totally different appearance and character, from any other polar lands that I have seen. At a distance, it appears low, and undulating, and of a light-brown colour: while all the surrounding coasts, with the exception of Perspective Ridge, are rugged, mountainous, and of a blackish-brown colour. And what rendered it still more strik-

ing at this time, was the remarkable freedom of the southern part from the least vestige of snow.

I landed near Cape Stewart, in the morning of the 26th, on a low sandy beach, about a mile from a range of cliffs, that were named after Mr PATRICK NEILL, Secretary to the Wernerian and Horticultural Societies, where there was a shore of low, level land, about 200 yards in breadth, on which we discovered a great many huts, and other proofs of the place having once been inhabited. This was by far the most interesting spot I visited, both as regards its mineralogical, botanical and other natural products, and its Esquimaux remains. Immediately to the southward of Neill's Cliffs, a vein or dike of greenstone (whinstone) occurs, consisting of erect prismatic columns, 60 or 100 feet in height, and from 1 to 3 feet in diameter. The columns are not, however, very regular, nor are they divided into joints, in the manner of some of the trap-rocks. They were found to consist of a fineish granular greenstone, not unlike that of the Shiant Islands, to which the columns bear a close resemblance. Proceeding from thence towards the north, along a fine smooth beach of white quartzose sand, we came to a river of some consequence for such a country, the bed of which being filled with large stones, and these concealed by the tumbling

stream, rendered the fording of it a little difficult. We landed at the foot of Neill's Cliffs, on a slightly elevated flat of ground, forming a tract about 300 yards in breadth, between the beach and the cliffs, and abounding in vegetable productions of a very grateful fragrance, and in interesting Esquimaux remains. Neill's Cliffs were found to be about 300 feet in height, full two-thirds of which were concealed by the debris of the higher strata: on this I ascended to the rock *in situ*; and found it to consist of a thick bed of bituminous slate,—coarse conglomerate, with a base of sandstone,—sandstone flag, or slaty sandstone,—calcareous sandstone,—fine granular limestone, full of organic remains,—and a coarse grained limestone of a grey colour, containing numerous large specimens of pectenites and other bivalve shells.

These were the principal rocks; but scattered specimens were also found of clay ironstone, slate-clay, common slate-coal, jet, splintery limestone, arenaceous limestone, &c.

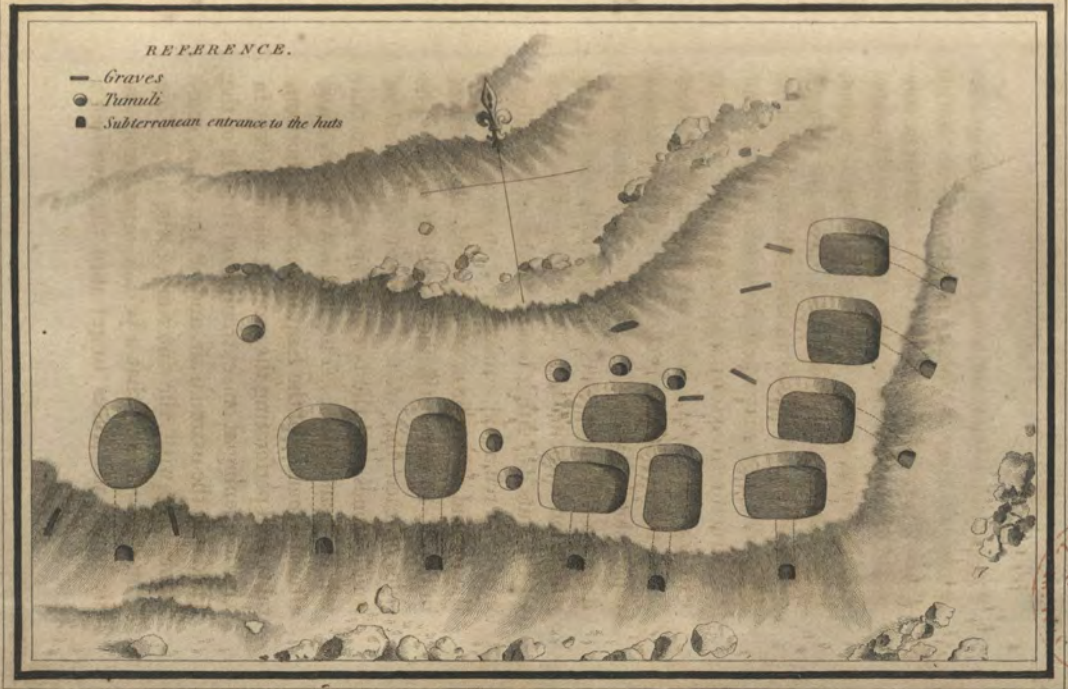
Most of these rocks were of a friable texture, and the general colour was light-brown. This tint gives the peculiar appearance to the cliffs of Jameson's Land which first excited my attention.

The rocks I had previously met with were, almost without an exception, primitive; and the

general structure of this country, as far as the extensive researches of Sir Charles Giesecké go, is also primitive; but now I was in a tract of land belonging to a formation not previously known to exist in Greenland, namely, the Coal-formation. Though none of the transition rocks were found, it is probable that these occur more inland. From the discovery of some loose masses of primitive clay-slate, and from the general character of the adjacent country, it is further probable, that the primitive rocks would have been discovered arising in succession behind and from beneath, had we had an opportunity of penetrating into the interior of the country. Only two other specimens of primitive rocks, besides the clay-slate, were found here, consisting of gneiss and red granite: these being taken from rolled masses on the beach might have been carried thither by the ice *.

* In the examination of the mineralogical specimens from this country, and in the descriptions of the geological character of the different places where I landed, I have to acknowledge considerable assistance received from my friends, Professor Jameson and Dr Traill. A general list of the rocks collected is included in the Appendix, No. I., to which I beg leave to refer such of my readers as either may wish for further information on the subject, or may be desirous of forming their own conclusions as to the geology of this part of Greenland.

Traces of inhabitation, some of them recent, occurred all over the plain at the foot of Neill's Cliffs. The most considerable and striking, consisted of the remains of a hamlet (Plate VI.) composed of nine or ten huts in close combination, besides many others scattered about the margin of the flat. This place, indeed, afforded the most admirable site that could have been selected, for the structures used by the Esquimaux for their winter's residences; being elevated about 50 feet above the beach, perfectly dry, and presenting a rapid slope towards the river that limits the plain on the south side, and towards the beach which forms the eastern boundary. The roofs of all the huts had either been removed or had fallen in; what remained, consisted of an excavation in the ground at the brow of the bank, about 4 feet in depth, 15 in length, and 6 to 9 in width. The sides of each hut were sustained by a wall of rough stones, and the bottom appeared to be gravel, clay, and moss. The access to these huts, after the manner of the Esquimaux, was a horizontal tunnel perforating the ground, about 15 feet in length, opening at one extremity on the side of the bank, into the external air, and, at the other, communicating with the interior of the hut. This tunnel was so low, that a person must creep on his hands and knees to get into the dwelling:



PLAN OF A DESERTED HAMLET, DISCOVERED ON JAMESON'S LAND

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it was roofed with slabs of stone and sods. This kind of hut being deeply sunk in the earth, and being accessible only by a subterranean passage, is generally considered as formed altogether under ground. As, indeed, it rises very little above the surface, and as the roof, when entire, is generally covered with sods, and clothed with moss or grass, it partakes so much of the appearance of the rest of the ground, that it can scarcely be distinguished from it. I was much struck by its admirable adaptation to the nature of the climate and the circumstances of the inhabitants. The uncivilized Esquimaux, using no fires in these habitations, but only lamps, which serve both for light and for warming their victuals, require, in the severities of winter, to economise, with the greatest care, such artificial warmth as they are able to produce in their huts. For this purpose, an under-ground dwelling, defended from the penetration of the frost by a roof of moss and earth, with an additional coating of a bed of snow, and preserved from the entrance of the piercing wind, by a long subterranean tunnel, without the possibility of being annoyed by any draught of air, but what is voluntarily admitted,—forms one of the best contrivances which, considering the limited resources, and the unenlightened state of these people, could possibly have been adopted. The

plan of the tunnel is ingenious. It always has its opening directed to the southward, both that the meridian rays of the spring and autumn sun may pierce it with their genial warmth, and that the north, east, and west winds, whose severity must be most intense, may blow past without penetrating. In some cases, the bottom of the tunnel is on a level with the floor of the hut; but, in others (when there is, perhaps unwittingly, a practical application of a scientific principle) the tunnel is so much below the hut, that the roof of the former coincides with the floor of the latter. On this plan, the cold air which creeps along the tunnel, being denser than the air in the hut, can have no tendency to rise into it, but the contrary, unless a circulation were intentionally encouraged, by allowing the escape of the warm air from the windows or roof. In general, it appears, that the interchange of air must be effected by the slow and almost imperceptible currents passing and repassing in the contracted tunnel.

In the hamlet now described, six of the huts were in a row, and very near together, on the southern bank of the plain, with openings or tunnels pointing to the southward: the easternmost of these was at the corner of the bank, where it began to trend to the northward; and, near this, were three others, on the eastern bank, with their

entrances obliquely directed towards the south or south-east.

Adjoining the huts, there were numerous excavations in the ground, that had apparently been employed for stores, and other offices. There were also several tumuli, and a considerable number of graves scattered about the hamlet. Many of the graves were immediately behind the huts; others were among them, or in front; and two or three were found in the floors of some of the older looking huts, which had probably become the burying-places of the last of the occupiers. These graves, in general, contained human bones. A very perfect skull was taken out of one of them, which, containing a fine set of teeth, with the dentes sapientes just protruding, and being of a small size, was supposed to have been a female of about twenty years of age. Many of the graves contained, in addition to the human bones, fragments of the implements used by the natives in their fishing and hunting. Among these, were a few pieces of "unicorn's horn," (the tooth of the narwal); some branches of rein-deers' horn; and several bits of wood that had undergone a rude sort of fabrication. These deposits of useful utensils, was an additional characteristic of the habits of the Esquimaux. This people, it is well known, in their natural and totally uncultivated state,

are of opinion, that they shall require their implements for their maintenance after death*. The highest virtue, in the opinion of many Esquimaux, consisting in a dexterous, successful, and industrious application to the business of hunting, &c.—and the best of their enjoyments, in connection with the support of life, being derived from the produce of their sealing and hunting,—they rest their title to happiness, in another state of existence, to the greatness of their exploits, or to the hardships they may have suffered; and they make the enjoyments of their Elysium, to consist in a perpetual day and endless summer; and, above all, in "an exuberance of fowls, fishes, rein-deer, and their beloved seals," which are to be caught without toil †. Some, indeed, believe that these animals will be provided, and cooked for them, without any care of their own; but others, less sanguine in their expectations, consider that they shall require their spears and darts to kill them (which are, therefore, buried along with them, when they die), but that they will be in such abundance as to render the capture of them rather an occupation of pleasure than of labour.

In some of the graves that we examined, pieces

* Crantz's Hist. of Greenland, vol. i. p. 237.

† Ibid. vol. i. p. 201.

of seal-skin or deer-skin were found among the bones: these were evidently the remains of the dresses in which the bodies had been interred. The graves were all dug in the earth, not built above the surface, as is the practice in rocky districts, and were covered over with slabs of sandstone or slate, with pieces of wood or bone laid across; and the bottom of many was lined with clay-slates. In all the human skulls found, it was remarked that the chin was very prominent, and the forehead greatly retreating.

Numerous pieces of rein-deers' horns were found about the hamlet. These had been artificially divided, in a manner that I should think peculiar to these people. Not having any instrument of the nature of a saw, the natives evidently effect the division of hard bones by drilling rows of contiguous holes. In this way, branches had been separated from the rein-deers' horns; and even longitudinal sections of unicorns' horns, of more than two inches in diameter, had been accomplished. As this latter substance is a real ivory, and consequently hard and close-grained, it cannot be drilled, I imagine, but with the use of iron. I sought in vain for any thing like a drill;—but these instruments being probably of great value to the natives, had been carefully collected when the hamlet was deserted, and only the less

important articles left behind. On some pieces of ivory and bone that we found, there were evident marks of an axe, or other sharp tool. It might, however, have been formed of stone, as the impression was not decidedly that of an iron instrument. Two axes made out of bone were picked up; and several bits of wood, rather rudely cut, and partly fabricated into domestic utensils, by burning.

Among the bones discovered in the hamlet, we could distinguish those of seals, walrusses, bears, rein-deer, dogs, narwals and whales. The thigh-bone of some large animal was also met with, the species of which we could not determine.

The number of inhabitants that have, at no very distant period, resided in Jameson's Land, must have been very considerable, since the remains of huts, with graves, were found all along the shore, in almost every place suitable for their erection.

The vegetation in Jameson's Land is superior to any thing that I could have expected in such a latitude. About the hamlet, the ground was richly clothed with grass, a foot in height; and more inland, my Father, who explored this country to a great extent, discovered considerable tracts that might justly be denominated *green-land*, patches of several acres, occurring here and there,

(according to the testimony of Mr Scott, surgeon of the Fame), "of as fine meadow-land as could be seen in England." There was a considerable variety of grasses, and many other plants in a beautiful state. A good deal of the vegetation, however, that was without shelter, was completely parched up by the heat of the sun. The most luxuriant tracts were those little low plains, similar to that near Neill's Cliffs, which were covered with a tolerable soil, where the percolation of the water from the melted snows of the higher land, produced a fruitful irrigation of the plains below. I obtained here very fine specimens, though mostly of the dwarf kind, of Ranunculus nivalis, Saxifraga cernua, S. nivalis, S. cæspitosa or Grœnlandica, S. oppositifolia, Eriophorum capitatum, Epilobium latifolium, Dryas octopetala, Papaver nudicaule, Rhodiola rosea, &c. with the creeping dwarf willows before met with. The whole number of species that I collected was about forty.

The produce of Jameson's Land, in the zoological department, as far as our researches extended, consisted, in quadrupeds, of rein-deer, white hares, and a new species of mouse, which has been named Mus Grœnlandica* ;—in birds, of eider-ducks, brent-geese, partridges, plover, and the

* See Appendix No. III.

usual arctic aquatic birds, though few in number; —and in insects, of butterflies, moths, bees, gnats, &c.* Some of the Fame's people discovered a bee's nest, which, after braving a formidable attack from the little inhabitants, they contrived to rob of the honey, which these industrious insects had stored for their future provision.

As the sun crossed the meridian whilst I remained on shore, with an unclouded sky, the heat became excessive. It produced such a degree of relaxation and thirst, that we were glad not only to drink of every refrigerant stream, but particularly to make use of the mountain-sorrel (Rumex digynus), which fortunately grew in innumerable tufts about the plain and along shore, whose acid properties were extremely grateful and refreshing. Mr Lloyd, captain of the Trafalgar, who, with my Father, accompanied me in part of this excursion, took advantage of a fresh breeze of wind from the southward, and sailed in his boat about twenty miles or more up Hurry's Inlet, where he landed on a projection of Jameson's Land. Here he experienced a degree of heat, as oppressive to his feelings, as he ever suffered either in the East or West Indies, to which torrid regions he had been a frequent visitor. It so

* See Appendix No. III.

far overcame some of his men, who had attempted to climb an adjoining hill, that they could not proceed, but lying down fell fast asleep, where they remained until some of their comrades, by an uncommon effort of perseverance and fatigue, fortunately succeeded in discovering them. The power of the sun was such as to occasion a very painful degree of ophthalmic inflammation, which they did not recover for several days. The mosquitoes, which were very numerous, likewise added to the inconveniences they suffered from the heat, by biting them with great severity. It is a remarkable fact, that while the wind on the surface of the water, in Hurry's Inlet, blew a smart gale, on the top of the hills it was a stark calm.

The effect of the heat on the ground was such, that in some places where the Fame's people discovered turf, it was so dry that it lit with a match, and afforded them a ready fire. By this means, some of the sailors, in one of their long excursions, who had been more provident than the rest, in taking out the necessary vessels and materials, boiled their coffee-pots, and cooked such victuals as the success of their sporting supplied them with. This proved an unfortunate contrivance for our zoological collection; for several ducks, partridges, and other birds that they had shot, instead of being carefully preserved and brought on

board, were, without scruple or care, coarsely skinned, broiled, and eaten on the spot.

When we landed at Cape Stewart, which was at 10 *h* 30 *m* A. M., apparent time, of the 27th of July, the tide had ebbed, as observed by its mark on the shore, about two feet perpendicular; and at 30 *m* past twelve, it seemed to be at the lowest, after which it began to flow. At this time (neap-tides), the rise and fall appeared to be three or four feet perpendicular. The flood-tide, on this part of Jameson's land, sets along-shore towards the WSW. (per compass); ebb-tide ENE., at the foot of Neill's Cliffs: but it is probable that the tide divides here about, different streams proceeding up the different inlets.

Striking is the contrast between the appearance of Jameson's Land and the southern coast of Scoresby's Sound, extending from Cape Brewster, westward. Jameson's Land, and, indeed, the opposite side of Hurry's Inlet also, has a considerable resemblance to the coast of Shetland in winter, being a dark coloured, naked, comparatively low, and undulating land, and giving rise to no icebergs: but the southern coast is a bold and mountainous country, much of it ice-clad, and of a beautifully interesting character. In its mountainous elevation and contour, it resembles the

CONTINUOUS VIEW OF THE LAND ON THE SOUTH SIDE OF SCORESBY'S SOUND, BEARING SOUTH WEST.

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sea-ward coast of Greenland in general; but there is a beautiful peculiarity in the stratification of the rocks. The structure of the mountains facing the north, are in general distinguished by numerous parallel, horizontal strata or beds, forming ledges not unlike steps, on a gigantic scale, which strata are distinguished from the rest of the dark coloured precipitous surfaces, by fine white lines of snow, that give the whole coast a beautiful and picturesque appearance. (See Plate VII). This structure appears to be rather similar to that which Captain Parry remarked in the land on the north side of Barrow's Strait. The height of the land on this border of the Sound, was estimated, in general, at 2600 feet. Two of the mountains were measured, by the angle subtended at a known distance, from which their height appeared to be 2604 feet, and 3000 feet. This coast is a grand source of icebergs. Every valley and ravine from Cape Brewster, for many leagues towards the west, is filled with ice. This, in some places, forms prodigious beds on the top of the front range of hills (which are in general of less elevation than the second range), extending, in a single surface, for many miles together. These ices or glaciers, evidently give rise to the numerous floating bergs with which the sea is strewed to an extent of thirty or forty miles, to the eastward and southward of

the south-eastern cape; the whole of which, though some of them reached the magnitude of 150 feet, or more, above the surface of the sea, or probably 1000 feet in thickness, and a mile in circumference, were mere dismemberments of these numerous and extensive glaciers. The site was, indeed, one of the best that could be imagined for their formation. Facing the north, the range of mountains behind forms a constant skreen, which, during ten or twelve hours at the height of the day, keeps the glaciers in the shade, and permits an uninterrupted accumulation of every moist deposition upon them, without ever being subjected to the height of summer temperature, with which all the other aspects of the Sound are more or less visited

The tint of this coast, at a little distance, is bister-brown. This general colour, contrasted with its vast beds of ice, and extensive tracts of snow, and connected with the beautiful structure of the mountains, their elevated character, and irregular summits, is productive of a highly pleasing and picturesque scene.

The rocks of which this coast is chiefly com-

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* The formation of these arctic glaciers is particularly described in the account of the Arctic Regions, vol. i. p. 107, 258.

posed, and which give it the peculiar form and structure, are probably secondary trap, consisting principally of greenstone and amygdaloid,—specimens of these rocks being brought by a party that I sent on shore near Cape Brewster, and others of a similar kind, being found in great abundance on some of the floating icebergs in the neighbourhood, which doubtless had their origin here. In addition to the secondary or floetz-trap rocks met with upon these icebergs, we likewise found specimens of clay-slate of the transition series, precisely like that which predominates in Dumfriesshire, and also a number of primitive rocks, consisting of granular felspar, hornblendic mica-slate, with gneiss and granite. Hence, we may infer, that this striking portion of the country contains several kinds of primitive and transition rocks, besides those of the secondary series. The party sent to collect mineralogical specimens near Cape Brewster, ascended over a fixed iceberg or glacier, to the top of a mountain, about 1500 feet high, where the acclivity was so steep, that when a stone was shaken loose, it rolled to the bottom, with accelerated velocity. I was disappointed in the result of their investigation, in the main, because they neglected to collect specimens of the rocks in general; but some of the little fragments they brought were of con-

siderable interest. These consisted of common calcedony, grey amethyst, crystallized white amethyst, magnetic greenstone, coarse brown coal, &c. This brown coal belongs to the secondary or floetz-trap formation, and is of the same description as the brown coal met with in nearly the same parallel, on the opposite side of the country, in Disco Island.

The plants collected in our different landings at Cape Hope, Cape Stewart, Cape Brewster, and on the shores of Hurry's Inlet, &c. amounted to about forty-six species*. Of these, the most interesting may be considered to be, the Arnica angustifolia, Stellaria nitida (nova spec.), Pedicularis hirsuta, Lusula arcuata, and the Salix, of which the species is doubtful. Fuci were very scarce. I only obtained specimens of two species, Fucus ciliatus, and Ulva umbilicalis.

No shells were seen, excepting two or three washed specimens of bivalves, of no particular interest or beauty.

The currents in Scoresby's Sound are somewhat remarkable. There seems to be an interchange of waters, produced by the operation of superior and

* A catalogue of my little Flora, is given in Appendix No. II.: for which, including the description of new species, I have been indebted to Dr Hooker.

inferior streams. By the action of the latter, it was presumed, a quantity of icebergs that were observed on our entrance to be within Cape Brewster, were, in the course of three days, carried out quite beyond this headland; while, by the action of the former, operating at the same time, we found the ships so retarded, that on attempting to beat out of the Sound, with a south-easterly wind, we could make little or no progress.

Besides these currents, there is also a regular tide of considerable strength, but of a very peculiar character, being so superficial, that it carries shallow floating bodies along with it; while those extending to the depth of several fathoms, are little or nothing affected by it. Its depth, I imagine, is sometimes not more than a fathom: For when, on leaving the Sound, we had arrived between the two headlands forming its entrance, we hove to for the purpose of sounding, and we were much astonished by the nature of the ship's drifting. The sails being all aback, the ship's head south-east, and the wind south-west, our drift ought to have been towards the ENE. or NE.; but according to the *wake* of the ship (the eddy produced in the sea by the ship's motion), she appeared to be drifting towards the NW., or directly a-stern. It would seem, that the lower parts of the ship were in still water; while a very superficial stratum, being the stream of the tide, was running

past her, at the rate of a knot or more, directly out of the sound. With a similar rate and direction it passed all the deeper ice, forming a strong eddy running to the south-eastward; but it was observed to carry all the thinnest ice before it. While we remained in the sound, I often observed, that when sailing across this tide in light winds, the ship could not be steered. Under a two-knot breeze, the ships in company were sometimes turned quite round. And, it was observable, when sailing nearly in the direction of the tide, that, on one tack, the ships could not be kept to, though each had its jib hauled down to assist the helm; and, on the other, they could scarcely be kept out of the wind, under the best arrangement of the sails. The direction of the tide is so modified by the different inlets, and probably, also by the wind, that I could by no means determine its particular sets. Its general direction, however, in mid-channel of the main inlet, was SE. and NW. by the compass,—nearly E. and W., true.

We met with no dangers in this sound. There is, indeed, a small rock above water near Cape Hope, and a shoal near Cape Stewart; but at a fair distance from the shore, the navigation, as far as we had an opportunity of observing, is without encumbrance. About the south-eastern shore of Jameson's Land, the water is more shallow than

in any other part of the sound that we examined. Our boats grounded on a sand-bank, about 200 yards from the beach, near Cape Stewart, and a considerable flat of sand skirts the shore opposite to Neill's Cliffs. The river adjoining the hamlet carries out with it a quantity of sand, which it deposits in its confluence with the sea, and forms one of those banks above noticed, extending about 200 yards off shore. In the middle of the sound there is very deep water. Due south of Cape Hope, and mid-way between Cape Brewster and Cape Tobin, there are more than 300 fathoms; and within a mile of the land we generally found 150 or 200 fathoms water. To the SE. of Cape Stewart, however, in the direction of the sand-banks, the depth is less considerable, the soundings being 125 fathoms, about two miles from the shore.

Calm weather is found greatly to prevail here at this season. In the height of summer, when the air is inclined to calm along the coast, a gentle or sometimes a fresh sea-breeze sets in about one or two o'clock in the afternoon. This at least was our experience whilst we remained in Scoresby's Sound. In the mornings, the wind was generally from the west or north-west; and in the afternoon from the south-eastward. In Hurry's Inlet, where the heat is very great, the sea-breeze

sets directly up it, or from the south-west, and frequently blows very fresh. The night wind or land breeze, on the contrary, is probably in an opposite direction.

During our stay in the sound, I carried on the operations for my survey, both on board and on shore, at every opportunity; whereby I obtained a very good plan of the principal inlet, together with a considerable extent of the ramifications proceeding from it. I had observations for the latitude, longitude, and variation of the compass, three times within the sound, and eight or nine series of bearings of the most remarkable headlands, hills, inlets, &c., and several sets of altitudes, for obtaining the height of the adjoining mountains.

CHAPTER IX.

COAST EXAMINED DOWN TO LATITUDE SIXTY-NINE.—ISLANDS, INLETS, AND HEADLANDS DISCOVERED AND NAMED.—RETURN TO THE NORTHWARD.—NUMEROUS ICEBERGS.—TEMPERATURE OF THE SEA AT THE BOTTOM.—FORMATION OF ICEBERGS, AND ENLARGEMENT OF FIELDS.—SEARCH FOR WHALES, AT A DISTANCE FROM THE LAND, UNSUCCESSFUL.—AGAIN APPROACH THE COAST.

Sunday, July 28th.—IN the night we stood to the south-eastward, as far as the loose ice; and then off and on during the day. The Fame and Trafalgar were in company. The wind was westerly, a gentle breeze; the weather clear and pleasant. At the preceding midnight the sun descended, until, in its apparent position, it just came to the horizon with its centre. It now quite disappeared, on crossing the meridian below the pole, thus setting for the first time in a period of ninety-three days. Notwithstanding this constant day-light, I have frequently used, in this journal, the terms Night and Day, because they are the most convenient and familiar, for the principal division of the twenty-four hours.

In the morning of the 29th, we fell in with an extraordinary chain of icebergs, which obliged us to stand nearly thirty miles off shore to double it. These icebergs were so numerous, that 140 were counted from the mast-head at one time. Our latitude was 69° 35′ 47″, by meridian observation; and the longitude 21° 39′ W., by chronometer. Having a light breeze from the northward, we steered to the WNW., until we came within sixteen miles of the land, and then proceeded to the westward, along shore. At 8 P. M. we were becalmed near a chain of floes and icebergs, stretching across our track. There were numbers of openings, however, in the chain, so that had we had a breeze, we could easily have penetrated through it, and could have reached a situation beyond, where there appeared to be a sufficiently free navigation. Here we made fast to a floe, until we replenished our stock of fresh-water, from one of the numerous pools upon its surface.

A little before midnight the sea froze all over, though the thermometer never sank below 31° at the height of the ship's deck. The sky being perfectly clear, and the sun in the horizon, this effect was attributable to the radiation, productive of cold, on which Dr Wells has founded his interesting theory of Dew. A curious optical deception occurred, when the sun was just about

setting, respecting the distance of objects. Seeing a piece of ice at the apparent distance of two or three miles, on which there was a great load of rocks, I sent a boat for the purpose of getting specimens from it. To the surprise of the people in the boat, as well as myself, they rowed hard for two or three hours before they reached it, when the mass of ice that had appeared to be only a few feet in height, under the erroneous idea we had formed of its distance, proved to be higher than a ship's mast-head.

From hence the coast, to an extent of 110 miles, was in sight; which, indeed, was seen the whole of the day. Roscoe Mountains were distinctly visible, even out of the cabin-windows, in an ordinary state of the atmosphere, when at the distance, by observation, of sixty-five miles. To the southward of Cape Brewster, the coast, as far as we could perceive it, trends nearly south-west, true. To an extent of forty miles, during this day's sailing, I obtained a survey of the land from intersecting bearings, with a similar extent from a single set of bearings and estimated distances. The whole addition to my survey, therefore, amounted to about eighty miles of coast; one-half of which may be considered as very well laid down. At the distance of six or eight leagues from Cape Brewster, there are two glaciers, or

land icebergs, which are somewhat remarkable for their extent. To the southward of these, the coast seemed to be flanked with islands to a considerable distance; several were distinctly made out; and as these, with an extensive tract of coast adjoining, were entirely free from snow, whilst the land considered as the main, had a considerable quantity of snow upon it and was likewise of a very different character, I could not but suspect that the islands were much more numerous than they appeared to be. The northernmost island discovered, which is a small one, was named after Mr CHARLES STEWARD of Yarmouth, who, several years ago, became my companion in one of my voyages to the whale-fishery. The next island, which is several miles in extent, I named after Captain G. W. MANBY, whose extraordinary exertions and success in the rescue of ship-wrecked mariners, entitles him to the gratitude of every seaman; and whose very gentlemanly conduct and pleasing society, were the means of rendering a recent voyage, wherein he accompanied me to the Polar Seas, one of the most agreeable I ever undertook. A third island, contiguous to the last mentioned, received the name of TURNER'S ISLAND, in compliment and respect to Mr Dawson Turner of Yarmouth: and a fourth was named after Dr HENRY of Manchester. These four islands lie

within the latitudes of 69° 32′ and 69° 47′. Two bold headlands, a little farther towards the south-west, were named after Mr JOHN DALTON, and Mr PETER EWART, of Manchester; and the extreme headland seen, lying in latitude about 69° 12′ and longitude 24° 25′ (?) W., was called CAPE BARCLAY, after Dr John Barclay of Edinburgh. Between Cape Barclay and Cape Ewart, there is an interval of some leagues, wherein I could not perceive any land. This inlet was named KNIGHTON BAY, in honour of Sir William Knighton, Private Secretary to his Majesty.

In addition to these islands, capes and inlets, some others on this coast likewise received names. A bay to the south-west of Cape Brewster was named WALLACE BAY, and three contiguous headlands, CAPE RUSSELL, CAPE GRAHAM and CAPE PILLANS, after four of the Professors in the University of Edinburgh.

July 30th.—Being now nearly two degrees of latitude farther south than the lowest parallel in which I had ever pursued the whale-fishery to advantage, and being disappointed in our expectations of finding whales in this extreme southern station, it was mutually agreed between my Father, Captain Lloyd, and myself, that we should proceed, in company, to the northward, and make extensive researches for whales in other quarters.

One whale was indeed seen, but this being in rapid motion, was neither sufficient encouragement to remain, nor to persevere into a still more southern latitude, to which my desire for further discoveries strongly inclined me.

In the forenoon, having a light breeze from the westward, we bore away to the eastward, for the purpose of doubling the chain of icebergs lying off Cape Brewster. Their number was found to be still greater than I had before apprehended. The sea, throughout an area of almost twenty miles in diameter, was almost covered with these prodigious floating bodies. At one time, I counted above 500 from the mast-head, of which scarcely any was less than the hull of a ship. About a hundred of them appeared to be as high as our mast-head. Some were certainly twice this height, or 200 feet above the surface of the sea, and several hundreds of yards in extent. One, which I had a good opportunity of estimating, was at least a mile in circumference, and 100 feet in height; three others were about 1800 feet in circumference, and 150 feet in height; and another was about 1000 feet in circumference, and 200 feet in height. They assumed a great variety of forms, and some difference of tints; but the prevailing appearance was that of cliffs or islands of chalk. In recent fractures, however, the

colour is a fine emerald green; and, in cavities, where the light is transmitted through a portion of the ice, it is a brilliant blue. Many of the icebergs contained strata of earth and stones, and some were loaded with beds of rock of great thickness, and weighing, by calculation, from 50,000 to 100,000 tons. One, in particular, was observed (if it was indeed an iceberg) that was loaded to the height of a ship's mast-head with such piles of rock, that only a very few specks of ice were visible. I obtained specimens of rocks from several of these, which consisted of gneiss, basaltic greenstone, some of it strongly magnetic, granular felspar, transition clay-slate, hornblendic mica-slate, a kind of granite, &c.

The weight of some of the icebergs is enormous. One of those above mentioned, was a mile in circumference, or 1500 feet square, and a hundred feet above the level of the sea. As it was nearly a parallelopipedon, its weight may easily be determined. Had its upper surface been exactly horizontal, the quantity of the mass below, to that above the level of the water, would have been in the proportion of 8.2 to 1 *; but, as there were some irregularities, the quantity of ice below in this berg may be considered as seven times

* Account of the Arctic Regions. vol. i. p. 234.

greater than the quantity floating above the surface of the sea. Hence its weight must have been equivalent to a mass of sea-water of 1500 feet square, and 700 feet thick, being the quantity that it displaced. The solid content of the water displaced, equal 1,575,000,000 cubic feet, divided by 35, the number of cubic feet of water of the Greenland Sea, in a ton weight, affords a quotient of forty-five millions of tons for the weight of the iceberg.

On the 31st of July, we continued our course to the north-eastward, under a light breeze of wind, southerly, skirting the western edge of the floes, and towards evening penetrating among them. The latitude, at noon, was 70° 25′; longitude 19° 11′ W. An angle of the highest peak of Roscoe Mountains, taken in passing them at a considerable distance, gave the altitude 4370 feet, which is probably a little too high. Saw a "razor-back," and several narwals.

Early in the morning of the 1st of August, a thick fog set in, and continued with little alteration the whole of the day. The next afternoon, having made a long stretch to the north-westward, in latitude 71° 50′, we got a glimpse of the land, at the distance of about twenty miles. Then tacking, we stood off, as directly as the nature of the ice and bewildering fog would permit.

In consequence of our return to the northward, the sun once more appeared on the horizon at midnight. Its centre, as elevated by the ordinary refraction of the atmosphere, had an altitude of about 0° 8′. But this was the last time that it performed a circuit without setting.

On the 3d, we saw two whales, and sent several boats in pursuit of them. They were in rapid motion, however, and gave us no chance of approaching them. In the afternoon, having stood a few miles to the westward, we got so unexpectedly involved in a heavy body of ice, that we found it expedient to moor all the ships to a floe, which had fortunately a clear side to leeward. Soon afterwards it cleared up, and we had pleasant weather for a few hours; but within two leagues to the eastward of us the "fog-bank" remained undispersed. The land was in sight, at the distance of fifty miles. Struck soundings in 192 fathoms, our latitude being about 72° 0′ N., and longitude 19° 16′ W.

Sunday, 4th of August.—The three ships being made fast within a hundred yards of each other, part of the Trafalgar's crew attended Divine Worship along with our people: and in the evening some of our seamen joined the crew of the Fame in their concluding Services of the Sabbath. The whole of the people attending these

services manifested a seriousness of deportment, and an apparent reverence for the presence of the Almighty, seldom exceeded in the best regulated and most devotional congregation on shore.

The weather was intensely foggy the whole of the day, which prevented us from perceiving the state of the ice around. A number of loose pieces set about us, but we were fortunately enabled to remain fastened to the floe until midnight, when a large sheet of ice was observed to be rapidly advancing towards us, which was only at the distance of fifty or sixty fathoms when it was discovered. Within five minutes we had the sails set, and the ship under-way. In the mean time, I sent a message to the Fame, which lay a little to windward of us, and not in sight of the place where the ice threatened in a few minutes to close her in, to warn my Father of the approaching danger. His habitual promptitude enabled him to make his escape, notwithstanding the extreme denseness of the fog, though, by this time, there was scarcely a ship's length space between the floes *.

* The liability to the sudden discovery of danger, among the whale-fishers, when deeply immersed in the ice and bewildered by foggy weather, requires them to be in a state of constant preparation, and to apply the most prompt

On the 5th we made a small remove to the ENE.; but the fog never wholly clearing away, we found it expedient to make fast again. Sounded in 155 fathoms, at 10 A. M., and in 129 fathoms in the evening; soft clay or mud.

August 6th.—No improvement in the weather still took place, excepting an occasional attenuation of the fog, so far, that we could see a distance of three or four miles; but this only occurred about mid-day.

At 10 A. M., being in latitude 72° 7′, and longitude 19° 11′ W., we obtained soundings in 118

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and vigorous efforts for their preservation. Hence, when they moor to the ice, under such circumstances, they do not "hand" their top-sails, but let them either remain "sheeted home," with the yards lowered down on the caps, or else clew them up at the mast-heads. In the former case, in getting suddenly under-way, they have only to hoist up the yards; and in the latter, they have merely to haul home the top-sail sheets; either of which operations may be accomplished within five minutes. As an additional facility, the courses are now usually set with a yard or boom at the foot, so as to require neither tacks nor sheets, but merely a tackle to the middle of the yard, to stretch the sail. With this arrangement, the courses are hauled up so snugly, as not to require any additional furling; and when needed, they can be set in a minute. Thus three-fourths of the time, or more, that is requisite in an ordinary merchantman, to set her sails, is saved; and a state of preparation secured, which is in many instances needful, for the preservation of the ship.

fathoms; muddy bottom. From the angle formed by the line, there appeared to be some little current setting towards the NW., true. The temperature of the sea, at the surface, was 34°; and within five fathoms of the bottom, by a Six's thermometer, it was 29°. The air, at the same time, was 42°.

In all former experiments upon the temperature of the Greenland Sea, I have invariably found it to be warmer below than at the surface. This exception, therefore, is remarkable. On my first trial, made in the summer of 1810, in latitude 76° 16′, longitude 9° 0′ E., the temperature, at the depth of 1380 feet, was found to be 33°.3 (by the water brought up), whilst at the surface it was 28°.8. In nearly twenty subsequent experiments, an increase of temperature was in like manner discovered on bringing water from below, or on sending down a register-thermometer to a considerable depth. In one instance (the latitude being 79° 0′ N., and longitude 5° 40′ E.) there was an increase of 7° of temperature on descending 600 feet; and in another series of experiments, near the same place, an increase of 8° was found at the depth of 4380 feet.

What renders this increase of temperature on descending in the Spitzbergen Sea, the more extraordinary, is the fact, that, in almost all other

regions of the globe, as far as observations have been made, a contrary law prevails, the sea being colder below than at the surface. This, at least, has been found to be generally the case in the Atlantic, in the Pacific, in the South Sea, and even in Baffin's Bay. These facts then intimate, that the cause, whatever it may be, which occasions the peculiar warmth in the Spitzbergen Sea, at great depths, does not operate in other regions generally, and not even in the contiguous seas on the coast of Greenland. The increase of temperature below, as I have formerly suggested, is probably occasioned by a stream of water ascending towards the north, near the western coast of Spitzbergen, which, on meeting with water near the ice of an inferior specific gravity, sinks below the surface, and becomes an under-current, counter to the prevalent superficial one running to the south-west *. It would therefore appear, that if this explanation be correct, the same counter under-current does not prevail on the coast of Greenland, but is confined, so far as observations on submarine temperature enable us to judge, to the seas contiguous to the western coasts of Norway and Spitzbergen.

As soon as the experiments on the tempera-

* Account of the Arctic Regions, vol. i. p. 209.

ture of the sea, at the bottom, were completed, we got under-way, with a strong breeze from the south-west, and proceeded towards the NE. until 1 P. M., when, falling in with a body of ice, we hauled up NW. After standing about 15 miles in this direction, along the "weather-side" of a large field, we doubled the western point among very crowded ice, and then, hauling up to the eastward under its lee, hove to.

The next day, though the weather continued foggy, and became rather windy, we renewed our search for whales, determined to make every exertion for improving our little cargo, during the short period for the fishery which yet remained. But we soon got involved in new difficulties, having been tempted into a "bight" of the ice, from whence there was no outlet to leeward. All our seamanship was required to beat out of this situation, where we had not only to contend against a narrow navigation, and numerous encumbrances from pieces of drift-ice, but against a remarkable superficial current, which almost prevented the ship steering, and greatly impeded her sailing.

August 8th.—We were engaged all night in retracing our way back to the field we had recently left, and were still inconvenienced by the general prevalence of the fog, and endangered, while among rank ice, by a gale of wind. In the af-

ternoon, we stood to the south-eastward, until we were stopped by a chain of floes, through which we could not discover a passage. In the evening the weather moderated, and the fog increased in density to that degree, that we had no safety but in having the ships moored to the ice: the three ships were therefore made fast to a floe.

The influence of a temperature some degrees above the freezing point, with the action of wetting fogs and a little rain, had formed lakes upon the surface of the sheet of ice to which we moored, so large, that, while the fog continued, we could not see across them. Where the snow was not wholly dissolved, there was another effect of this state of the weather, deserving attention, inasmuch as it casts a considerable light upon the mode of formation of icebergs, and of the enlargement of ice-fields. The upper stratum of the floe, which had originally consisted of loose light snow, was now much reduced in thickness, and formed, by the infiltration of the dissolving surface, into vertical needles, and irregular prisms of transparent ice. These prisms, upon a sheet of ice, formerly examined, that was in a similar state, were five or six inches in length, and seemed to have given form one to another, the number of sides in each, like what occurs in pillars of basalt, being equal to the number of prisms or

columns that come in contact with it. They seemed to have a very slight attachment to the surface of ice upon which they were found, and little or none to one another. On another mass of ice, under similar circumstances, all the snow that remained on the surface was converted into small transparent bits of ice. These, according to their situation, varied from the size of a pea to that of a nutmeg, or even of a walnut. They were somewhat globular, but, being like the prisms bounded by a varying number of planes, they seemed to have derived their form partly from the shape and number of the contiguous pieces, and partly from a tendency to crystallization. Several very perfect figures were observed, which, had they been found detached, would have been considered as ice-crystals, and their formation the sole effect of crystallization. These were in particular dodecahedrons, cubes, rhomboids, prisms, and pyramids. This conversion of snow into transparent pieces of ice, under a thawing temperature, may serve to account for the parallel lines of air-bubbles, that occur in most masses of fresh-water ice; also, for the resolution of ice into vertical prisms, when it is slowly dissolved in a proper position; for the formation of fields of fresh-water ice; and for the manner in which the icebergs receive their enlargement. The enlargement of

fields or icebergs, by the consolidation of a stratum of these icy-nodules and crystals, admits of a very easy explanation. It is only necessary to suppose, that when the surface is still in a loose state, it is cooled down to a low temperature by a keen frost, and then visited by a wetting fog or shower of rain: in this state, it is evident, that the moisture received among the icy-crystals will be consolidated, so long as their temperature remains below the freezing point, and that even after this, if the consolidation be merely sufficient to prevent the escape of the rain-water, a recurrence of the frost will convert the whole into a solid stratum of ice.

August, 9th.—The wind, which for several days in succession had blown from the southward or south-westward, now shifted to the opposite quarter. It soon increased to a stiff gale, and was attended by an incessant fall of rain. Having failed in our hopes of falling in with whales, in the various directions we had searched at a distance from the land, it was agreed, at a consultation held with my Father and Captain Lloyd, that we should as a last effort revisit the coast. This was a measure to which I was strongly inclined, both on account of some little expectation that I still indulged of meeting with whales, and, in the event of failing in this,

because of the hope there was of obtaining amusement and useful employment, by extending my surveys and researches in the latitude of 72°, a parallel in which I had had but few observations on the position of the land, and these obtained very imperfectly, in consequence of the great distance at which they were made.

As soon, therefore, as we had obtained a little rest, we made sail, and proceeded to the SW., W. and NW., accordingly as the openings among the fields and floes admitted the best passage; and though the extent to which we could see was very small, on account of a heavy and incessant fall of rain, we accomplished, in the course of the day, a distance of about 50 miles. At night, we made fast to a floe, with the expectation of being able to reach the land the next day.

CHAPTER X.

AGAIN APPROACH THE COAST.—ISLANDS AND INLETS DISCOVERED AND NAMED.—LAND UPON *TRAILL ISLAND*.—RELICS OF NATIVES MET WITH.—NARROW ESCAPE OF THE SHIP FROM A DANGEROUS SITUATION.—STRONG TIDES IN THE OPENING OF DAVY'S SOUND.—RESEARCHES MADE BY TWO PARTIES OF MEN SENT ON SHORE.—SURVEY OF THE COAST CONTINUED.—DESCRIPTION OF ANTHELIA AND CORONÆ.

EARLY in the morning of Saturday the 10th of August, blowing fresh at NE., we cast loose from the ice, and renewed our exploration towards the NW., for the purpose of getting in-shore. The weather being either hazy, with rain, or thick with fog, we experienced considerable difficulties in attaining our object; but having taken advantage of the more lucid intervals, between the showers, for penetrating the different chains of floes that thwarted our course, we made very rapid progress towards the coast. At 2 P. M. we descried land; and soon afterwards, the weather having cleared up near the shore, we discovered an opening extending to the very beach. We pursued this "lead" until we came into 13 fathoms water, at the

distance of 2½ miles from the land. Here we made fast to a large sheet of land-ice, that was not yet broken up, stretching from within a furlong of the shore (the ice being dissolved in the shallow water,) to the extent of six or eight miles towards the E. and beyond the reach of vision towards the NE. A separation having taken place in this ice, in the line of our approach, directly across it, from SE. to NW., the disengaged sheets had been drifted to the southward, while the ice to which we moored remained fast staked to the spot, by means of a number of grounded icebergs. Hence, a perfectly clear lake, of two or three leagues diameter, was produced by this separation in the land-ice, under the action of recent northerly gales. The Fame and Trafalgar, which were still in company, likewise moored to the land-ice, with the design of examining the coast, and contiguous inlets, by means of the boats, and with some slight hopes of discovering whales. As far as my experience enabled me to judge, this seemed the most likely situation for affording whales that we had for some time visited. The ice ran almost close to the shore, and it formed a fine clear bay to the southward, which was occupied by the ships. It appeared to me, that were any whales to visit the coast during our stay, this would be the most probable situation

for their appearance. And in this opinion both the captains of the ships in company acquiesced.

The land, abreast of the ship (bearing NWbW. true) had every appearance of an island. It was named TRAILL ISLAND, in compliment to a highly esteemed friend, Dr Thomas Stewart Traill of Liverpool. The latitude of the middle of it, is about 72° 12′. The south-eastern part of it is a stupendous cliff, rising from the very sea, without a yard of beach, at an angle of fifty degrees, or upwards, to the height of about 1300 feet. This cliff is of singular beauty. The prevailing colour, which is slate-blue, or bluish-grey, is intersected and variegated by zig-zag strata of bright yellow and red. From the peculiar structure and distribution of the strata of this part of the coast, it received the name of VANDYKE CLIFFS. The northern termination of these cliffs, consists of an acute ridge, jutting into a short promontory, which was named CAPE MOORSOM, out of respect to Mr Richard Moorsom *junior* of Whitby; and another headland, a little farther north, was called CAPE MEWBURN, after an old school companion and fellow collegian.

The summit of the ridge on Cape Moorsom, consists of a series of sharp and elevated pinnacles. Some of these are so particularly slender, so full of rents, and so devoid of support, except-

ing from the narrow base on which they stand, that it seems surprising how they retain their position. It appeared indeed probable, from the great mass of rocks at the foot of the ridge, apparently the ruins of the pinnacled summits, that every heavy gale of wind brings some of them down.

The most remote headland of Traill Island that was seen, lies about five miles to the northward of Cape Moorsom: this was named, after a reverend friend in Whitby, CAPE YOUNG.

Traill Island lies rather within, or to the westward of, the general line of the coast. Its extent in latitude is about ten miles. To southward of it, a very large inlet was discovered, which I named DAVY'S SOUND, in honour of the much respected President of the Royal Society. And, to the northward, another opening was observed, that received the name of MOUNTNORRIS INLET, in honour of Lord Mountnorris. The northern boundary of the latter inlet lies nearly east and west, true, and is terminated to the eastward by a bold headland, to which the name of our enterprising and highly respected north-western navigator, Captain PARRY, was applied.

To the southward of Traill Island, the land was but imperfectly seen, on account of a constant haziness in that quarter, which did not wholly disperse for some days.

Soon after the three ships were made fast, there being an interval of fair weather, and tolerably clear, a boat from each ship proceeded to the shore. I landed under Vandyke Cliffs, near Cape Moorsom, on a steep slope, formed by the debris of the rocks above. After one unsuccessful attempt to ascend, I entered upon a slope included between two precipitous rocks, and with much labour accomplished about 500 feet, above which, the cliff rising vertically, prevented farther progress in that direction; but, after skirting the brow of another precipice below me, where the inclination was at least 50°, and the surface entirely composed of loose sharp stones, I reached the bottom of a chasm between two prodigious pinnacles, and again proceeded upward. This attempt, which I was induced to undertake for the purpose of collecting specimens of the rocks and plants, eventually assumed such a hazardous aspect, that I would gladly have relinquished it, could I have conveniently returned. The rocks of the pinnacles bounding the chasm, distant about twenty feet from each other, were vertical on both sides. One of these rocks, which was greatly decomposed and broken, so as to afford by no means a firm hold, I was obliged to grasp with my left hand, and to thrust my right hand among the loose stones, while every step was accomplished; and it fre-

quently required considerable deliberation before a second step could be attempted. A slip of the foot here, might have been fatal, as the bottom of the chasm opened on a precipice of 400 or 500 feet, over which, whenever I moved, a large shower of the loose stones about me, were immediately precipitated. At the top, I expected to find at least some portion of flat surface, that I hoped would repay me by its productions, for the hazardous exploit into which my anxiety for specimens of minerals, plants, and animals, had unexpectedly betrayed me. But, to my surprise, the top proved to be a ridge (with the sea on both sides) narrower and sharper than the top of the highest pitched roof. Here I rested for a few minutes, seated on the ridge, with a leg over each side, pointed to the water, under two terrific vertical pinnacles, between two and three hundred feet in elevation. These actually vibrated with the force of the wind, and appeared altogether so shattered and unstable, that it was astonishing how they remained erect. I was far from being at ease in such a threatening situation, and therefore made a hasty retreat, by sliding down the side opposite to that by which I had ascended, a good deal rejoiced to find that this, being less steep, and not so dangerously interrupted by precipices, afforded a much safer descent than the other.

In this excursion, not a vestige of vegetation, excepting two or three lichens, was observed. There was not, indeed, the least portion of mould for their growth, the whole surface of the ridge at Cape Moorsom, as well as the bases of Vandyke Cliffs, consisting of a deep bed of sharp stones. My mineralogical object, however, was quite successful. I got access to all the most curious and interesting rocks that were seen, and was enabled to collect specimens from many of the veins, by which the predominant rock was variously intersected. The prevailing rock was found to be slate-clay, in some places inclining to bituminous shale. The strata at Vandyke Cliffs lie nearly vertical; but near Cape Moorsom, where there is a sudden dislocation, the beds become horizontal. The lowest visible rock at this Cape is a bed of slate-clay rock, some hundreds of feet in thickness; then occurs a horizontal stratum of highly crystallized porphyry, of a red colour on the surface. This is surmounted by another thick bed of slate-clay, which, inclining to the nature of bituminous shale, is much less compact than the lower bed, yet sufficiently solid under a horizontal arrangement of the strata, to form the magnificent pinnacles of this Cape. With any other direction of the stratification, however, it is evident that these immense irregular columns could never have been

sustained. Occasional unequal veins of greenstone, and different varieties of porphyry, occur towards the summit of the cliffs, and in some places appear to intersect the pinnacles.

About the middle of Vandyke Cliffs, where the beautiful structure of the rocks, and fine alternations of colour are observable, the slate-clay, in its vertical arrangement, forms lanceolate pinnacles, and is repeatedly intersected, in waving lines, running horizontally, with yellow and red-stained porphyry; so that the back pinnacles, as they progressively attain a greater elevation, and become visible one over another, present numerous parallel zig-zag or serpentine bands of various colours. These striking colours, which are remarkably bright, were traced to the decomposition of iron-pyrites. The yellow bands, or veins, were found to consist of whitish porphyry, containing a great abundance of imbedded grains, and small cubical crystals of common iron-pyrites, by the decomposition of which the yellow incrustation on the surface was produced. The red bands were either porphyry or slate-clay, which also obtained their colour from an incrustation with the decomposed pyrites, in a different state of oxidation.

This interesting part of the country appeared to be principally composed of secondary or floetz-trap, and secondary porphyry. Both these rocks

were associated with varieties of slate-clay, sometimes inclining to bituminous shale, and with quartzy sandstone. The whole of the cliffs appeared to be traversed in all directions, by veins of greenstone, porphyry, and compact felspar,—the latter sometimes passing into claystone.

After sliding down the steep of Cape Moorsom, I skirted the base of the cliff to the northward with some difficulty, until I reached a stripe of ice firmly frozen to the ground, and partly under water. On this I was enabled to travel to an extensive plain near Cape Mewburn, the surface of which is an uninterrupted expanse of loose stones and gravel, remarkable for its nakedness as to vegetation. Here I observed renewed traces of inhabitants. The ground-plots of two summer huts were clearly laid out; and an external fire-place, with ashes, and portions of charred wood, yet remained. Numbers of pieces of manufactured bones were also picked up: on some of these, as before observed, the rows of holes, by which they had been divided, were very apparent.

My Father, who crossed the country behind Vandyke Cliffs, from Cape Moorsom to the south-eastern headland of the island, which we named Cape Simpson, met with numerous relics of the natives. On a flat of land, having a southern aspect, he found the remains of at least fifty sum-

mer residences. Great quantities of bones (among which skulls of bears, narwals, rein-deer, and other animals were recognised), were scattered about this plain. It was observable, that all the bears' heads wanted the lower jaw; while the upper jaw, in many, retained all the teeth, and was quite perfect.

As the ship was stationary, and it was not convenient to remove, for getting intersecting bearings of the coast, to carry on my survey, I was obliged to take a series of observations on shore. The station I selected was Cape Moorsom, from whence the distance of the Baffin was found, by the angle which her mast subtended, to be 14,514 feet, or 2 miles, 2434 feet. With this distance, as a base, and intersecting bearings taken at the extremities, the form and position of the contiguous head-lands were determined. The angle subtended by Vandyke Cliffs, at the ship, was 4° 36′, which gave the height 1292 feet.

The heavy fall of rain with which we had been constantly visited for thirty hours, previous to our landing on Traill Island, was only suspended for a few hours. It recommenced at 10 P. M., and drew a veil over the land, before my observations were quite completed.

Sunday, 11th August.—The land-floe to which the three ships were moored, being held by

the grounded icebergs with which it was pierced, fortunately remained secure the whole day, (though it blew tremendously hard at NE.,) and kept a clear lake to leeward for the ships to ride in. The gale was so heavy, that we were obliged to moor with two hawsers and a warp; and still feeling ourselves insecure, we thought it necessary to have our anchors in readiness for bringing the ship up, in the event of any thing giving way. After these necessary arrangements were made, we attended to the sacred duties of the Sabbath without interruption. The rain continued heavy and incessant.

Early on Monday morning, the wind having rather moderated, and the rain being less heavy, agreeable to previous arrangement, we joined the Fame and Trafalgar, in forming two parties for the examination of the inlets bordering Traill Island. The ostensible object of these expeditions was to search for whales. It was presumed, that such secluded inlets would be congenial to the habits of these animals. If any were met with, either of the two parties was sufficiently strong to make a powerful attack upon them for the general benefit. The equipment of the boats with sails and provisions was completed about 6 A. M., when two of our boats, accompanied by two of the Trafalgar's and three of the Fame's, proceeded towards

Mountnorris' Inlet, and a similar party, under the direction of Captain Lloyd, into Davy's Sound.

We had soon occasion, however, to repent of this arrangement; for the wind and rain, instead of subsiding, as we had hoped, greatly increased. And to add to the evil, the land-ice broke across, and the bergs supporting it were forced off the bank by the pressure of ice to windward; so that the part to which the ships were moored was liberated. We now found ourselves in motion towards the south-west, and rapidly approaching a body of ice that was brought up by the land to leeward of us. This obliged us to get hastily under-way, and beat to windward on the eastern side of the floes connected with the land. The Fame and Trafalgar followed our example; Captain Lloyd having fortunately returned to his ship at this critical juncture.

This being the anniversary of his Majesty's birth-day, though the weather and our situation were both extremely unfavourable for social enjoyment, was, nevertheless, remembered by us with due loyalty; and the King's health, with best wishes for a long and prosperous reign, was drank with much warmth of feeling. Had opportunity offered, it was the mutual wish of myself and my father to have taken formal possession of the coun-

try on this day, for which occasion the ceremony was deferred. In the fulfilment of this desire we were disappointed; and, unfortunately, no other opportunity of landing occurred during our stay upon the coast.

We continued to stand off and on the whole day, in anxious expectation of the return of our boats. In the evening two of them arrived; at 10 P. M. another came on board; and a little after midnight, to my great comfort, and not less so to the comfort of the sailors who had been on this service, the last reached the ship. Having hove-to for some little time, to get the boats hoisted up and secured, we suddenly, and unexpectedly perceived, through the haziness occasioned by the rain, that we were close down to the lee ice, and drifting towards it with extraordinary rapidity. This was the effect of a strong tide, of the existence of which we had not before been aware, as no stream whatever was observed while we lay off Cape Moorsom. All sail that could be carried with safety was immediately made; and after some almost fruitless tacks, we succeeded in weathering a point of the lee ice, that had interrupted our reach to the eastward, and appeared then to be out of danger.

As I was greatly fatigued by keeping the deck most of the day, exposed to a fall of rain so

heavy and incessant, as to defy every precaution for its exclusion, and to be the means of wetting me to the skin three or four different times, I retired to bed about midnight, leaving the ship in charge of the chief-mate. After two hours spent in disturbed and unrefreshing rest, my attention was attracted, by observing that the ship was twice tacked within five minutes. Alarmed by such a mark of entanglement and contracted navigation, I instantly jumped up, and slipping on a large wrapper, ran upon deck. The moment was a most important and critical one; the ship being again involved in the very "bight" out of which I had so recently extricated her, with the ice rapidly closing about her on every side. The width of the bight when I went below, (included between the loose eastern floes and a chain of floes to the westward, that was brought up by the shore), was about two miles; but now it was reduced to a quarter of that distance. Our position in the bight was most unfavourable, being between a large floe to the eastward, and a sheet of thin land-ice to the westward, which were fast approaching each other; and the width already diminished to 150 yards. More sail was instantly spread,—all our seamanship was called into action; and notwithstanding the narrowness of the channel and leewardly current, the ship was worked with such

effect, that we were within ten yards of doubling the point lying to the eastward; but, on attempting another tack, we found the width diminished to sixty yards, which, defying all our efforts, obliged us to push into the bay-ice to the westward, and endeavour to force a passage through it. A pressure of canvas, and the best possible management were indispensable for success. Though it blew a strong gale at the time, we set top-gallant sails upon double-reefed topsails, and gave the ship every sail that her masts could sustain. Thus impelled, she accomplished an entrance into the ice, and still more powerfully urged by keeping off the wind with the yards a little squared, she continued to advance, though the ice in many places proved to be from 12 to 18 inches in thickness. Sometimes, indeed, our progress seeming to be suspended, occasioned the most anxious feelings of apprehension; but eventually, the exterior edge of the ice gave way under the pressure of the ship, and released us into a more navigable situation. Still, however, we were in jeopardy, as in this delay we had been carried by the tide deep into the bight, where it was contracted to very small dimensions. Here the excellent properties of the ship availed us; and after a tack or two, which called forth all the dexterity of which we were capable, we happily gained ground, (though

the tide or current was setting to the WSW., or almost directly to leeward, at the rate of nearly three knots), and eventually doubled the point of the eastern floe, where the width expanded to nearly a league. Finding this channel also closing, we penetrated the eastern boundary, consisting of a chain of floes, through which we fortunately discovered a passage. Then stretching five or six miles to the eastward, we fell into a commodious opening amid the floes, where we were enabled to reduce sail at the moment that it was indispensable so to do, on account of a great increase of the gale. The rain continued unabated, descending almost in torrents.

Soon after we reached a place of safety, we saw the Fame following us, under a pressure of canvas that few ships perhaps could have sustained. The Trafalgar, however, though she was considerably to windward of us at the time we doubled the point of difficulty, having inadvertently stood a little to the westward of it, (the captain not being aware of what was going forward,) was intercepted by the same point on her return. All exertions to weather it afterwards, it seems, were fruitless. The tide, indeed, set so fiercely to leeward, and the bight was so much contracted, that, in a short time, she was completely hemmed in, without room to make a tack. In the morning this ship

was seen at a distance, closely beset, in a situation which, in this advanced state of the season, when the ice was fast packing upon the shore, could not be considered in any light but that of great danger: it was a situation, indeed, from which, had a strong wind from the eastward arisen, there seemed to be little prospect of escaping.

It is observable, in a personal review of the events of life, especially with those who pursue an adventurous occupation, that some of the most important circumstances appear to result from a mere simple accident, or from a chain of contingencies, apparently of the most trivial nature. Thus, as an acute and judicious author observes, "the most trivial events may determine our state in the world. Turning up one street instead of another, may bring us into company with a person whom we should not otherwise have met; and this may lead to a train of other events, which may determine the happiness or misery of our lives*." It was such a trifling circumstance as my rising from my bed at night, without being apprised of danger (a step which it might appear romantic, to represent as having been taken in consequence of dreams of involvement and shipwreck), that became the means of our escape from a hazardous

* Remains of the Rev. Richard Cecil, p. 104.

entanglement, the particulars of which have been detailed. And on this apparently casual circumstance, it was, subsequently, most satisfactorily proved, depended the ultimate *success* of our voyage and probably our safety also. For it is very certain, that, had I remained five minutes longer below, or had any part of the great exertion we made been neglected, our future success would have been prevented, and our safety highly endangered. I do not scruple to attribute this circumstance so important to us, (for we must be permitted to consider that of importance which effectually furthered us in the chief object of the voyage), to a providential influence on the mind; my principles, my feelings, and my consciousness, all forbid me to call it accidental. Neither do I consider it right to omit this reflection, which arose out of the subsequent events of this week: for I conceive it would be a blameable and weak concession to the opinions of those who do not think with myself, to shrink from the acknowledgment of those superior influences, of a providential nature and tendency, when so many remarks of a nautical or philosophical kind, and some of these for the connection of events necessarily of an uninteresting description, are, without scruple, admitted; and when no other observation, that has any claim to importance, is ever

withheld. And if that philosophy which investigates the laws, properties, and phenomena of matter, is worthy of occupying the minds of those who stand highest in the scale of human intelligence; the philosophy of a Particular Providence, by which we discover innumerable marks of beneficence towards ourselves, which can scarcely fail to excite grateful feelings in our hearts towards the Author of them, *must*, in a far higher degree, be worthy of the consideration and regard of all classes of mankind.

The fierce tides in the opening of Davy's Sound, when there is much ice about, render the approach to the land, especially on the southern side of the Sound, not a little dangerous: For, when any of the heavy floes take the ground, or come in contact with grounded bergs, or other ice, so as to be brought up, the neighbouring floes are swept against them by the strong influx of water, with great rapidity and with astonishing force. Besides, the set of the tide is so various, in different positions (determined probably by the nature of the adjoining coasts, or inlets, and possibly influenced by the position of the ice) that the effect can seldom be fully estimated. On passing the point of the floe which we experienced so much difficulty in doubling, there was a rippling on the surface of the water, like "a race," arising appa-

rently from a change in the set of the tide; and, on crossing it, the ship refused the helm, though her head-way was rapid, and the gale strong, so as to spring up against the helm nearly head to wind. When we first moored to the ice, abreast of Cape Moorsom, we observed very little stream, though the tide was so fierce a few miles to the northward. Hence it is likely that the tide may divide in this position, being nearly in the middle between Mountnorris Inlet and Davy's Sound, and a separate branch run up each inlet. This probable division of the stream, would well account for the still water we experienced off Cape Moorsom. In Davy's Sound, the stream of tide was found to be so strong, that our people could scarcely stem it in the fastest boats. The rise and fall on the beach was also considerable. We had no opportunity of determining it with any degree of accuracy; but I imagine it to be about eight or ten feet perpendicular at the springs.

Some little information was derived from the investigations made in the contiguous inlets by the boats; but, as no whales were met with, the grand object for which they were dispatched altogether failed. In Mountnorris Inlet, several islands were discovered by my officers. A large one seems to lie near the middle, and a number of small ones (seven I was informed were counted)

on the northern side of the inlet. Though the position and form of these could not be determined, yet, as their existence is certain, I considered myself entitled to name them; and accordingly, called the group CRAIG ISLANDS, after a much respected Episcopalian clergyman of Edinburgh. The ice having set down upon the shore by the force of the wind, the interior of Mountnorris Inlet was rendered inaccessible to the boats. Cape Young was the limit to which they could advance in this direction. This party, though they landed several times, saw no vegetation but what was completely beaten down by the heavy rains. No traces of inhabitants were observed. These were not to be expected, indeed, in such a situation,—a place with a northern aspect not being congenial to the habits, nor suitable for the residences of the Esquimaux. They brought a few specimens of the rocks, consisting principally of nodules of iron-clay, pieces of slate-clay, porphyry, and amygdaloid.

The other party that proceeded into Davy's Sound, found the southern shore of Traill Island clear of ice; and, had the weather been favourable, might have made very extensive, and no doubt interesting researches. The relics of the natives upon this shore were extremely numerous. On one flat of land, a little to the westward

of Cape Simpson, they observed several dozens of old huts and ground-plots of summer tents. A lamp, of the kind commonly used by the Esquimaux, was picked up by one of the Trafalgar's sailors. Our people found a great many fragments of bones, pierced with holes, that had evidently been used for the keels of sledges. These consisted of slices of the bones of whales, and of the horns or teeth of narwals. One piece of the latter was nearly two feet in length; and another fragment, not quite so long, measured $2\frac{1}{2}$ inches in diameter. It was observable that these, like former specimens met with, had been divided longitudinally, by drilling two rows of contiguous holes through the substance of the bone, beginning at opposite sides, and then split asunder. It appeared also, that, after this operation, the segments had been roughly dressed by a kind of axe, or other cutting instrument, by which the surface was marked and torn. These bones were all flat on one side, and convex or semi-cylindrical on the other: the flat side was evidently designed to be applied to the sledge, and the convex side to the friction of the ground. The great quantity of these fragments intimated, not only that the inhabitants had once been numerous here, but that they must make great use of their sledges, to afford so many pieces of these half worn

defences for the keels. One large piece of main-keel was found entire. It was composed of fir wood (probably drift-timber) and defended by a row of pieces of bone, fastened to it by wooden pegs inserted in holes $\frac{4}{10}$ths of an inch in diameter. There were remains and bones of rein-deer, dogs, narwals, seals, bears, &c. about the old hamlets they visited, and these in very great abundance. Several partridges were seen, which were so tame that some of them were knocked down with stones, and a small bird was taken up alive by the hand.

The long and tedious gale which commenced blowing at NE., in the night of the 10th–11th of August, about noon of the 13th, began to subside; and the rain, which had fallen in one heavy and incessant shower that lasted sixty-two hours, at length abated. With little intermission, indeed, we had heavy rain from Thursday morning until this day, the Tuesday following,—a period of 130 hours. During this interval we never saw the sun for a moment; and so great was the density of cloud above us, that I never even observed any superior brightness in the quarter of the heavens occupied by the sun. The quantity of rain that fell far exceeded any thing of the kind I ever before witnessed. Our boats were likely to be torn from the tackles by the weight of water that collected in them before it was observed; and, after that, they were emptied repeatedly.

As soon as the wind began to subside, the Fame made sail and proceeded to windward, in search of two of her boats yet absent. The Trafalgar at the same time making a signal, which we interpreted to indicate a state of danger, we approached her as near as we prudently could, and then hove to, or stood off and on, the remainder of the day and succeeding night.

In the evening, there was a short interval of partially clear weather. The land became visible from NE ⅓ N. (per compass) to SW b W. The coast seemed to be an assemblage of islands, with inlets, some of them of considerable width, among them. Vandyke Cliffs were found to be distant 11½ miles. This distance, with the bearing of these cliffs, and of other points of land before observed from Cape Moorsom, enabled me to determine their respective positions. And it was remarkable, that the distances by protraction, and the estimated distances of five or six headlands, several leagues from both the stations, generally coincided to within 1½ miles, and some of them exactly.

Wednesday, 14*th August*.—The morning was calm and foggy; but very fortunately the sun became visible a few minutes before twelve o'clock, so that I obtained an excellent observation for the latitude, and afterwards got good sights for the longitude and variation. These observations were

of the greatest consequence to me, for without them, all that had previously been accomplished, towards the survey of Traill Island and the adjacent inlets, would have been in a great measure useless. While we lay off Cape Moorsom, I was most anxious to have determined the position of the ship; but the sun never for a moment appeared, until long after the ice broke away, and obliged us to retire from the shore. The plan I now adopted for rendering my previous operations efficient, was by ascertaining the true bearing and exact distance of Vandyke Cliffs. The direction of these cliffs, observed by an azimuth compass from the mast-head, and corrected for the variation, afforded, with little trouble, the true bearing; and an altitude of the cliffs above the horizon, taken with a sextant, enabled me, knowing their real elevation, to calculate the exact distance. These results applied, in a converse direction, to the place of the ship determined by celestial observations, gave, with great accuracy, the position of Vandyke Cliffs, and consequently enabled me to determine the latitude and longitude of every other headland, whose position in relation to these cliffs had been previously laid down.

The land being in sight from S 46° W to N 31° E., per compass, and every part very distinct,

I took a sketch of the whole visible coast, and the bearings of every remarkable headland, bay, and mountain. The northern limit of the particular survey made on the 20th of July, was now the most southern object in view, bearing very nearly due south: this fortunate position of a point of land determined twenty-five days before, enabled me, not only to connect the two surveys, independently of the chronometrical observations now obtained, but also to correct the rate of my chronometer. The longitude of the ship, determined by the bearing of the land, was 21° 22′ W., and by the chronometer, 21° 42′ 30″ W. This difference of 20′ 30″ arose from the error in the original rate of the instrument, which was not at this time exactly known; but it was subsequently compensated with all possible care, and the observations for longitude given throughout this volume corrected. The variation, by the mean of two sets of observations, appeared to be 43° 22′ W. The first set gave 43° 20′, and the second 43° 24′.

The coast now in sight was nearly ninety miles in extent, north and south, of which, by the aid of observations made on the 26th of June, and on the 8th, 12th, 17th and 20th of July, I was enabled to obtain a very good survey.

From a point of land, in latitude 71° 14′, the northern limit of the survey accomplished on the

20th of July, the coast continues to trend nearly north and south, true, as far as 71° 33′, where the Liverpool coast terminates in a bold headland. This was named CAPE GLADSTONE, in compliment to John Gladstone, Esq. M. P., of Liverpool. Beyond this cape the coast trends to the south-west, true, so as to form a deep inlet, two or three leagues in width, which, running towards Hurry's Inlet, and being seen to meet it within about fifteen miles, renders it probable that the Liverpool coast is an island, and that Hurry's Inlet is a sound or channel, separating it from the islands or main, lying to the westward. To the north-west of Cape Gladstone, the whole coast has the appearance of islands. A considerable tract of bold land, in latitude 71° 36′ to 71° 47′, that seemed to be insular, received the name of CANNING ISLAND, after one of the Secretaries of State, many years representative of Liverpool; and a contiguous smaller island was named after Sir JAMES EDWARD SMITH, President of the Linnean Society.

Our position at this time was nearly in the middle of the opening of Davy's Sound, of which, the two islands last mentioned, and other land to the westward of them, constitute the southern boundary, and Traill Island the northern boundary; the width of the sound betwixt them being about

sixteen miles. A distant tract of a mountainous country was seen to run across the interior of Davy's Sound. But it appears to be insular, and does not close up the Sound. Three capes that were distinctly defined on the southern part of this island, received the names of CAPE BIOT, CAPE ROSSILY, and CAPE BUACHE, in compliment to three French Philosophers, members of the Institute; and the north-eastern Cape of the same island was called after Professor PICTET of Geneva. To the westward of this island there is a small chain of the most elevated mountains hitherto met with upon this coast. This chain, named WERNER MOUNTAINS, in respect to the memory of the celebrated geologist, is distinctly seen at the distance of between thirty and forty leagues, in the ordinary state of the atmosphere, and is so bold that it gives to the mountainous coast before it, the appearance of low hummocky land. To the southward of Cape Biot is a ramification of the Main Sound, which was named FLEMING INLET, after the esteemed author of the "Philosophy of Zoology," penetrating to the westward and southward; and between Cape Pictet and Traill Island, Davy's Sound runs towards the north-west, to an extent that, being beyond the reach of vision, could not be determined. As we had no opportunity of getting intersect-

ing bearings of the land in the interior of Davy's Sound, an accurate survey could not be obtained; but all that could be expected from a careful and repeated examination of the coast, for estimating the distances, and discovering the indentations and promontories, was accomplished. Two headlands, in Fleming Inlet, received the names of CAPE SEAFORTH, and CAPE CARNEGIE, in compliment to two much respected families of Edinburgh; and some promontories in the northern branch of Hurry's Inlet, were called after different friends, chiefly resident in the Scottish capital, whose names appear in the general chart.

In the evening of this day, after an interval of about five hours of clear weather, the fog drew its bewildering skreen over the prospect, and put a stop to my observations on the coast. But another exhibition, of a very interesting nature, fully compensated for the curtailing of my surveying operations, at this time, especially as I had other opportunities of completing them to my entire satisfaction. This exhibition consisted in a splendid display of five concentric coronæ, or prismatic circles, produced by the action of the sun on a low stratum of fog. These phenomena had often been observed in the preceding parts of the voyage; but as this was by far the most interest-

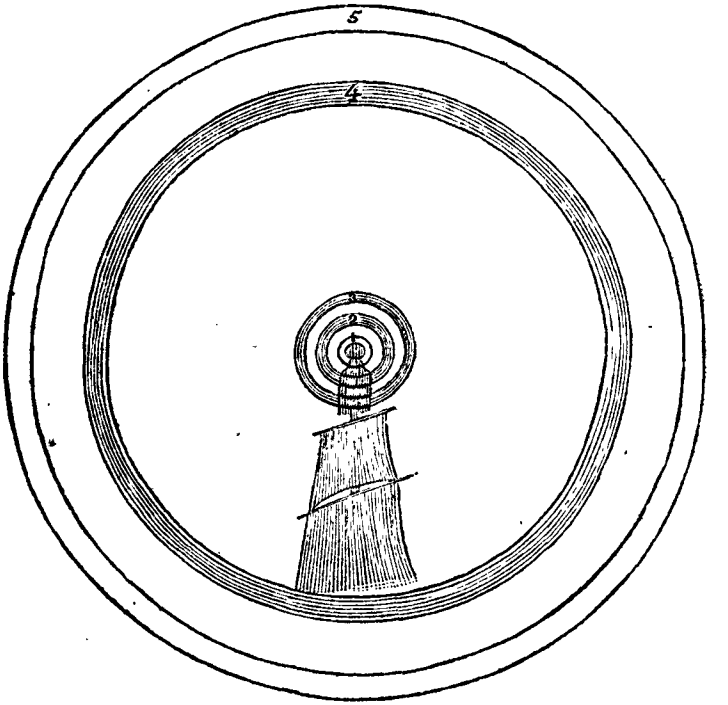
ing appearance of the kind that occurred, the description has been reserved for this occasion. In the following remarks on coronæ, &c. I have taken advantage of my former observations on the subject; and instead of confining myself to a particular description of what occurred on this day only, I have preferred giving a more general account of the phenomena.

Coronæ may be observed whenever the sun shines during foggy weather; and this is often the case, the polar fogs frequently consisting merely of a thin stratum, partaking of the nature of clouds, resting on the surface of the sea, and extending only to the height of fifty or sixty yards. At such times, though objects on the water can scarcely be discerned at the distance of a hundred yards, sometimes not more than fifty, the sun is frequently not only visible, but shines with nearly the effulgence it exhibits in a clear sky. Under such circumstances, an observer, elevated on a ship's mast, ninety or a hundred feet above the level of the sea, will perceive one or more prismatic circles depicted on the fog. These circles are all concentric, the centre being in a line drawn from the sun through the point of vision, until it meets the visible vapour in a situation 180° distant from, or exactly opposite to, the sun. The number of coronæ varies from one to four or five.

They are generally the most numerous, and the colours the most brilliant, when the sun is brightest, and the fog most dense, and low or partial. In all cases, the shadow of the head of the observer is seen in the centre of the circles, together with the shadow of the "crow's-nest," at the mast-head, or other place from whence the observation is made, and also of the masts and sails immediately adjoining. The interior circle, occurring at the centre, is so small, that, being highly luminous, it forms a brilliant *anthelion*, or glory, round the spectrum of the observer.

On the 23d of July 1821, latitude 74° 10′, longitude 12° 30′ W., 200 miles within the verge of the polar ice, the coronæ were the most brilliant and beautiful that I ever observed them; so that their description may serve for that of the phenomena in general. These coronæ (as seen from the mast-head, 105 feet above the level of the sea) were four in number, and, as usual, all concentric. When the fog was the most dense, the sun fortunately shone with peculiar brightness, and gave to each of the two inner circles, 1 and 2 of the annexed figure, a distinct series of the colours of the spectrum; but when the fog in the intervals of the showers, became more attenuated, these two were apparently intermingled, so as to present a single luminous zone, or diffuse glory.

The order of the colours, reckoned from the interior, was, as far as I could determine, as follows. In No. 1., white or yellow, red, purple: in No. 2., blue, green, yellow, red, purple: in No. 3., green, whitish (or faint yellow), red, purple: and, in



No. 4., greyish-white, darker on the edges. The colours of No. 1., were occasionally very vivid, and also of No. 2.; but the colours of No. 3., which

only appeared at intervals, were very faint; and the colours of No. 4. merely luminous shades of grey. Having carried a pocket sextant with me to the mast-head, I took some pains to determine the diameters and breadths of the different coronæ; but I found the reflections in the glasses of the sextant so faint, that they could not be measured in the ordinary way. I therefore hove the ship to, and waited until a small lump of ice, floating on the water, came in a line with the outer circle. This being a conspicuous object, I brought its image in the sextant, in contact with the glory in the centre, and consequently determined the radius of the circle. The following results were thus obtained. Radius of the circle No. 4.,—inner edge, 36° 50′; middle, about 38° 50′; outer edge, about 41° or 42°; breadth of the circle, about 5°. The greatest semi-diameter of the primary rain-bow, with which this circle might be fairly compared, is 42° 17′; so that it is not improbable but this might have proved the same, had it been sufficiently defined to admit of accurate measurement. The semi-diameter of No. 3., was, by estimation, about 6° 30′; of No. 2., the exterior limit by measurement, about 4° 45′; and of No. 1., by estimation, from $1\frac{1}{2}$° to 2°. The sun's altitude at this time was 35° 42′, consequently, the depression of the glory below the horizon the same. The

upper edge of the circle No. 4., extended about 6° above the horizon; and the reflected image of the sun on the water was 108° 36′ distant from the glory. The fog only extending 8° or 10° above the horizon, the upper edge of the fourth corona was sometimes very near the summit of the "fog-bank." The sky above being perfectly cloudless, the sun shone with uncommon splendour. The shadows of the ship's masts, sails, and rigging, as well as that of the observer, were evidently impressed on the water, since they continued, without alteration, after the dispersion of the fog: but the coloured circles were all dependent on the fog, strengthening (during the height of the sun) as the fog became denser, and appearing more and more faint, as the fog became more attenuated. The same effects, it was observed, took place in a ruffled rea, as in a calm smooth surface. It required a high degree of illumination, and a very dense fog, to produce No. 3. Part of these phenomena were observed from the deck, an elevation not exceeding sixteen feet; but they were confined to a faint glory, and a broad white circle, corresponding, in diameter, with No. 4.

These phenomena, with some slight differences, were repeated on the 27th July (the same year), during thick fog-showers, with a fresh breeze of wind. During the greater part of this day the

fog was high and dense. Two circles only then occurred; an interior one, nearly corresponding in diameter with No. 2., and an exterior one, similar to No. 4. On the fog becoming less dense, the sun's rays had then to pass through a thinner stratum, and produced the coronæ No. 1. and 2., with vivid colours, in the precise order as those formerly observed, and already described. The diameter of No. 2. seemed to the eye, to vary considerably, being much more diffuse at one time than at another. When the sun declined near the horizon, and the fog became more elevated, the prismatic circles almost entirely disappeared. From the circumstance of a ship near us being enveloped in fog a few minutes before it reached the *Baffin*, I was enabled to determine, by the known height of her masts, the elevation of the stratum of mist. Two observations of the same nature, gave the total thickness of the fog 160 feet. In the fog that occurred in both the instances here recorded, I observed many shining spiculæ in the air, supposed to be crystals of snow, but so small that I was unable to discover them in any situation but when floating in the breeze; so that I could not apply the microscope for examining their form. It appeared to me doubtful, whether these spiculæ might not contribute towards the production of some of the phenomena

now described, to account for which, on the ordinary principles of reflection and refraction from globular bodies, seems to be difficult, if at all practicable.

I have often contemplated these beautiful spectrums with peculiar pleasure. The prospect, at the time of their occurrence, being circumscribed by the fog, to an area of a few acres, serves to fix the attention more closely on the only interesting object that meets the eye, whose radiance, and harmony of colouring, added to the singular appearance of the observer's shadow, dignified, as it were, by an attendant glory, can scarcely fail to be productive of sensations of admiration and delight.

In the year 1820, I recollect observing another circle besides those that have been described, of larger diameter than No. 4. As it was a faint whitish-grey circle, while No. 4., seen at the same time, was variegated with the principal colours of the spectrum, it seems probable that it was merely the secondary rain-bow continued throughout the circle. The same number of coronæ also occurred on the day of the present voyage under which these remarks are introduced.

The three interior circles were prismatic, the colours being in the same order as in those seen on the 23d July 1821, excepting No. 2., which seemed to commence with yellow towards the centre, then red, purple, blue, &c. No. 1. was ra-

ther indistinct: No. 2. extremely bright: No. 3. rather faint. These three coronæ were very near together, the colours following in such close succession as nearly to coalesce. No. 4. (?) was of a faint grey colour; and No. 5. (?) smoke-grey, broad and distinct. The fog, at this time, was only 150 to 200 feet high: sun's altitude about 8°.

As the fourth and fifth circles seem to correspond, in appearance and diameter, with the primary and secondary rain-bows, it is reasonable to look for an explanation of the phenomena in the same cause, namely, the reflection of the rays of the sun, decomposed by different refractions, in minute globules of water, of which the mist, wherein the coronæ occur, in a great measure appears to consist. The anthelion, in the centre, may possibly be occasioned by the reflection of the sun's direct rays, falling on the central parts of the globules of vapour. Each globule will thus reflect two specks of light, one from the nearest, and another from the most remote surface; consequently, the combined reflections may be abundantly sufficient for the production of a glory in the centre of the coronæ: and, as the figure of the observer is in a straight line between the sun and the centre of the whole of the circles, the shadow of his head is necessarily encompassed by this glory. As the glory is often beautifully coloured externally,—may not the rays of light falling *near*

the axis of the globules, immediately around the centre of the circles, undergo a slight refraction from the circumstance of being out of the centre, and thus exhibit the prismatic colours? But, admitting the explanations now offered to be agreeable to the laws of dioptrics, it will not, I believe, be possible to account for the formation of the second and third coronæ, by any probable combination of reflections and refractions by globular particles. Hence, it is not improbable, that the snowy spiculæ observed in both the instances here recorded, may have had a share in the production of the phenomena. And this idea, I perceive, is supported by the opinion of M. Bouguer, who observed anthelia and coronæ, somewhat similar, on the top of Mount Pichinca, one of the Cordilleras, at the time of sun-rising. His description, which only recently fell under my observation, is given in the "Histoire de l'Académie Royale des Sciences" of France, for the year 1744. Among many judicious and correct observations on the subject, he remarks, that "Le phénomène outre cela ne se trace que sur les nuages, et même sur ceux dont les particules sont glacées, et non pas sur les gouttes de pluie, comme l'arc-en-ciel."

The figure of the observer in the centre of the anthelion, witnessed by M. Bouguer, was impressed on the edge of a cloud:—in all the cases that have

come under my observation, however, the shadows were evidently reflected from the surface of the sea, remaining unaltered after the dispersion of the fog, and the consequent disappearance of the coronæ.

The anthelion has generally been considered as a rare phenomenon; and especially when combined with the concentric crowns, has, I believe, been observed by very few individuals. Mr Swinton, who saw an anthelion near Oxford, in the year 1762, was only able to meet with two instances upon record,—one observed near Dantzic, by Hevelius, in 1661; and another seen at Wittemberg, 18th January 1738 *.

Dr (Thomas) Young, in his theory of haloes, observes, that equilateral prismatic crystals of ice (of 60°) produce a deviation of 23° 37′, "for rays forming equal angles with its surfaces, and the angle of deviation varies at first very slowly, as the inclination changes, the variation amounting to less than 3°, while the inclination changes 30°." The effect of such prisms, he conceives, if placed at all possible angles in the air, between an observer and the sun, would be to produce a circle of light at the angular distance of about 23° 37′; or within 3° of it, which is the usual diameter of the halo; and the halo of 47° he accounts for on

* Phil. Trans. vol. lii. p. 94.

the supposition of a considerable part of the light falling, after one refraction, on a second particle; so as to double the effect. "If," as Dr Young further suggests, "the prisms be so short as to form triangular plates, these plates, in falling through the air, will tend to assume a vertical direction, and a much greater number of them will be in this situation than in any other. The reflection from their flat surfaces, will consequently produce a horizontal circle of equal height with the sun; and their refraction will exhibit a bright parhelion immediately over the sun, with an appearance of wings or horns, diverging upwards from the parhelion."

I state these opinions of Dr Young, on the cause of phenomena, nearly allied to the anthelia and coronæ, that have now been described, both because they may serve, perhaps, to explain the origin of the second and third crowns, and because they are opinions that receive considerable support from the circumstance of snow, of a pyramidal, lamellar, and prismatic form, being frequently seen in the Arctic Regions, where the phenomena of haloes and parhelia are particularly common. On a recent voyage, indeed, to the coast of Greenland, two parhelia, and a horizontal band of white light, were observed at a time, when snow of a prismatic form, among many other figures, was seen falling.

CHAPTER XI.

"A RUN OF FISH."—FIVE VERY LARGE WHALES STRUCK, AND THREE OF THEM CAPTURED, IN ONE DAY.—ICE FORMED ON THE SEA, THE AIR BEING ABOVE THE FREEZING TEMPERATURE.—SURVEYS AND RESEARCHES CONTINUED.—ADVENTURES OF SOME OF THE FAME'S CREW ON SHORE.—TREMENDOUS GALE.—SHIP GROUNDED UPON A SHELF OF ICE, SQUEEZED OFF AGAIN, AND PROVIDENTIALLY RESCUED FROM A SITUATION OF EXTREME PERIL.—SURVEY OF THE COAST CONCLUDED.—INDICATIONS OF APPROACHING WINTER.—FINAL DEPARTURE FROM THE COAST.

DURING the six preceding weeks, our search for whales proved almost wholly unsuccessful,—few of these animals, not perhaps a dozen in all, having been seen in this long interval, of which, a small one only became our prize. The fishing season was now drawing to a close;—the land had already assumed its winter covering of snow,—the sea began to freeze in the evenings,—and the gloom produced by the departure of the sun every night, marked the approach of winter, and warned us, that the time for leaving the coast was almost at hand. The only hope of additional success,

that we could indulge, depended on our vicinity to this coast; and the Trafalgar and Fame, being both beset, (the latter having also got hemmed in by the ice, whilst pressing in-shore for the recovery of her boats), had claims upon our attendance in this very place. These were important reasons why we should persevere to the utmost limit of time, which the needful regard to personal safety, and the preservation of our own ship, would at all warrant.

The resolution to which these considerations gave rise, proved a most important one to every person interested in the prosperity of our voyage, as the proceedings and occurrences of this day, the 15th of August, will sufficiently illustrate.

About four in the morning, the weather being calm and foggy, I had notice given me, that some animals of the whale tribe had been heard "blowing;" but it was feared that they were not the species of which we were in search (the mysticetus), but the "razor-back," or some other kind of whale, the capture of which we had not the means of accomplishing. On sending a boat, however, to ascertain the species, we were most agreeably surprised with the exclamation, so delightful to the ear of a whale-fisher, of "A fall—a fall!" Fortunately the weather cleared up at this interesting crisis, and the boat that had been sent out

on observation, was seen with its jack flying, as a token of being "fast to a fish." Misled by a whale that passed the ship as the boats were lowered, which was mistaken for the "fast-fish," most of our officers pursued it to such a distance, that the real object of capture had nearly been abandoned in their thoughtless eagerness for the chase. One boat, only, out of six, joined the fast-boat, near which, in a state of great exhaustion, the fast-fish soon afterwards arose, and received another harpoon. A reserve boat that had luckily been kept on board, was now dispatched to their assistance, —and after a bold and energetic attack with this small force, had been continued for some time, the capture of the animal was accomplished. The sea here not being unfathomable, as in the more eastern fishing-stations, the line of the "first fast-boat" had lain on the bottom: on its being hauled in, several fine specimens of the beautiful species of star-fish called Asterias Caput Medusæ, were found clinging to it. The depth of water was about 250 fathoms.

Having taken the whale alongside, we ran the ship a little off the land-floes, under a light breeze from the westward, and moored to a piece of ice. Several whales being astir, and the weather fine, we did not immediately secure our prize, but sent all the boats out again in pursuit. These whales

were rather numerous,—four or five being sometimes seen at a time. The usual stay of a whale at the surface, for breathing, is about two minutes, seldom much longer; but it was a remarkable circumstance in the conduct of these whales, that they remained regularly from five to fifteen minutes at a time, and some nearly half an hour, before they descended out of sight. During this long interval, they were generally perfectly motionless, and afforded the most excellent opportunities for attacking them. Soon after the departure of the boats, two whales were harpooned; but to our great grief and disappointment, both of them escaped, by the breaking of the "foreganger," or that part of the line immediately connected with the harpoon. In one case, the line, which had been much exposed to damp weather, appeared to have been faulty; but in the other, the line retained its full strength, and appeared to have been broken, by being wrapped round the tail of the fish, in a way that no cordage of ordinary thickness, under the tension sometimes occasioned by the bending of this member, could possibly withstand.

Notwithstanding these discouragements, we continued to persevere for several hours, and at length another whale was struck. Assistance not being at hand, it was nearly two hours before a second

harpoon was fastened, on the striking of which, without the application of a single lance, the wounded animal dived to the bottom, and died there. Probably it had been stunned by the blow it received against the rocks. The hauling of this fish up by the lines, and the clearing it afterwards of a floe, under which it was carried by the current, proved a tedious business, having occupied all hands for several hours. Just before these measures were completed, another whale having arisen within sight of the people in the boats, was pursued and entangled. This, after much chasing, and many displays of its formidable tail in the air, as if in resistance of our attacks, likewise fell under our lances.

The inset of Davy's Sound had, by this time, brought the ship close to the land-ice, that had now accumulated and packed to the breadth of fourteen miles from the shore, and obliged us to cast loose from the ice, and get under-way, though deprived of the assistance of all our boats, and with only four persons (none of whom were seamen) to assist me in setting the sails, and working the ship. About 2 A. M., of the 16th of August, we joined some of the boats, and having afterwards got our prizes in tow, we stretched about a league to the eastward, that we might be well clear of the land-ice: we then moored to the first

little floe we met with, and began to flense the whales we had captured, for their final security.

While we were employed in these interesting occupations, the Trafalgar escaped from the critical state of besetment in which she became involved on the 12th. We observed that she joined a strange sail that hove in sight at the time, and not being aware how we were engaged, stood away in company with her to the eastward, and was not afterwards seen. The Fame likewise succeeded in making her escape from the entanglement and danger of the land-ice; but too late, unfortunately, for benefitting by the "run of fish," which we were enabled so well to improve.

The day having been clear and fine throughout, I obtained a very excellent series of bearings of headlands, &c. with observations for the latitude, longitude, and variation. These enabled me to correct my former projection of the coasts of Davy's Sound, and contiguous lands; and to determine the situation of the nearer headlands and islands, with sufficient accuracy.

In the night of the 15th–16th, stars were seen for the first time, during fifteen weeks. The sky being beautifully clear, the sea, as usual on such occasions, began to freeze as soon as the sun descended within four or five degrees of the horizon, though the temperature was considerably above

the freezing point of sea-water. This circumstance must be attributed to the cooling of the surface of the water, agreeable to the theory of Dr Wells as to the cause of Dew, by the effect of radiation between the surface of the sea and the atmosphere. Whether the heat of the water be ejected into the atmosphere, or whether a cold influence from the atmosphere be conveyed to the water, may be a doubtful question;—but the fact of the abstraction of the heat of the water, when exposed to the full aspect of a cloudless sky, is certain and obvious. In cloudy weather, no freezing of the sea, I believe, ever occurs, when the temperature is above 29°; but in clear calm weather, the sea in the interstices of the ice, generally freezes on the decline of the sun towards the meridian below the pole, though the temperature be 32°, or higher. In the instance now alluded to, the freezing commenced when the temperature was 36°, being 7½° or 8° above the freezing point of sea-water. About 2 A. M. the thermometer in the air fell to 33°, by which time the bay-ice was of such consistence, that the head-way of the ship, under a light breeze, was sometimes stopped by it.

The flensing of our three whales, including an interval of three hours allowed the people for resting, occupied nearly four-and-twenty hours. Not having been accustomed, for many weeks, to se-

vere exertion, the whole crew were greatly fatigued. In the blubber of one of the fish, the head of a harpoon was found imbedded. It was entirely concealed beneath the skin, and its place only marked by a whitish cicatrice. It seemed to have been a long time in this situation, the shank of the instrument having been separated, apparently by the decay of the iron protruding through the skin. The fish, nevertheless, was evidently in a healthy state, as appeared from its great produce in blubber. The total produce of the three fish was calculated to yield sixty tuns of oil, and three tons of whalebone,—the united value of which proved to be about L. 2,100. This was an important accession to our former cargo, and raised us at once to the level of the most successful fishers of the season.

It is a circumstance that appears to be worthy of observation, that these three whales were all males; and another killed by the crew of the Fame, near the same place, a day or two afterwards, was of the same sex. This fact intimates a separation of the sexes at this season of the year; as upon all other occasions, I have almost invariably found an indiscriminate mixture of males and females. The females, perhaps, retire into the interior of the bays and sounds at this season, which is generally considered as the commence-

ment of the period of gestation; or they may seek the same retreat for the purpose of training their young.

On the 17th of August, some whales again made their appearance, and were pursued by two of our boats; but the people not having had sufficient rest to refresh them, made little effort, and were unsuccessful. We were indeed obliged to recall them from the chase, in consequence of a fresh gale of wind having arisen at NE., which soon carried us almost into contact with the land-ice. On casting-off, to seek for a place of greater security, we found the ship so *tender* (yielding greatly to the influence of the wind), that we could scarcely carry sail. This arose from the great weight of blubber taken into the 'tween-decks, where its tendency to diminish the stability of the ship, operated to such an unfavourable extent, that we could scarcely stand upon the deck. Added to this inconvenience, we found that the ship had sprung a leak, owing to her increased draught of water, that kept the pumps in almost constant action.

After stretching a few miles to the eastward, we were glad to get once more moored to a floe, where, for a little time, we rode in safety.

Sunday, 18th August.—The gale continued all night, attended with heavy rain. About six

in the morning, we found ourselves again drifting into a body of floes, which obliged us to cast-off, notwithstanding the unfavourable state of the weather, and to beat to windward, into a more commodious and safer situation. This was accomplished with difficulty, as the decks were lumbered with casks and whalebone, so as to be almost impassable; and the ship yielding to the gale, so as to be almost "on her beam-ends." About noon, having reached an eligible situation, we made fast to a small floe, where we rode out the gale.

The following day the wind abated, and enabled us to undertake the needful operation of making-off, until the performance of which, the ship was in a very disagreeable and unsafe state. Before midnight, the whole of our casks that yet contained water as ballast, were emptied, and the contents replaced with blubber.

On the 20th, the weather, which had been foggy for some time, cleared up, and we found, as usual, that the ship was again almost alongside of the land-ice, having been set thither by the influence of a westerly current. We immediately made sail, but owing to the want of wind at the time, it was twelve hours before we got out of the crowded ice, into a roomy situation a few miles to the eastward. Here we were joined

by the Fame, and both ships made fast to a piece of ice.

Having had a few hours of clear weather in the course of the day, very excellent observations were obtained for the continuation of my survey. The latitude at mid-day was 71° 50′ 28″. In the afternoon, the longitude was 20° 43′ 15″ W., and the variation of the compass 43° 24′ W. Some headlands being seen that were particularly well marked, received names. A cape of this description, forming the north-eastern point of Canning Island, was named after Mr ROBERT WARDLAW of Tillicoultry; and three others on the eastern side of the same island were called CAPE ALLAN, CAPE CRAWFORD, and CAPE FLETCHER, after different Edinburgh friends. Another headland, about 6 leagues to the westward of Cape Wardlaw, was named CAPE BROWN, after the celebrated botanist. And two more capes within the supposed northern entrance of Hurry's Inlet, were distinguished with the names of the Russian navigator Captain KRUSENSTERN, and the celebrated Geological traveller Baron Von BUCH.

My Father visited me in the evening, and informed me that his two boats, with thirteen men, whose absence had caused him such anxiety and loss, were abroad nearly forty hours in the severe storm of the 12th and 13th. Being provided with

fuel and provisions, they made fires in tents constructed with their boat-sails and oars on shore, whereby they not only derived a comfortable degree of warmth, but likewise the means of dressing their food. In this way they soon got their clothes partially dried, and themselves a little refreshed. On looking out for the ships, in a moment of comparative clearness of the atmosphere, they were thrown into great consternation to find that they were all out of sight, and that a large body of ice had interposed between the ships and the shore. They immediately repaired to their boats, and proceeding along shore, in a channel fortunately left by the grounding of the ice, that was sufficient for them, they reached Cape Moorsom, near which the ships were moored at the time they entered upon their expedition. But as no ship was yet to be seen, they stood off the land, threading the interstices of the floes, and climbing almost every elevated hummock they passed, in the hope of discovering the object of their search. But their anxious and laborious researches, rendered particularly trying by the inclemency of the weather, proved, during many hours, entirely discouraging and fruitless. The heavy rain that continued incessantly falling, had long wetted them to the skin, and served greatly to accelerate the depression of spirits, that threatened to paralyze their exer-

tions. Their provisions not having been husbanded with any care in the outset, were almost expended; and as they knew that the land, in this quarter, afforded no nourishment that they could obtain, excepting an occasional partridge, they became almost overwhelmed with apprehensions of perishing from the want of food. The body of ice that had packed against the land, appearing to these despairing seamen interminable, they were afraid that the ships must be forced off to such a distance as to render their junction extremely doubtful. In the height of their apprehensions, many schemes were alternately suggested for their preservation, and then rejected as impracticable. Some would return to the shore, where their sails would at least afford them shelter, and where they might obtain a fire and dry their dripping clothes; but doing this, they found, would only prolong their miseries, and diminish their chance of meeting with one or other of the ships. Others talked of trying to reach Iceland,—of pulling out to sea, to seek for other whalers,—of going along the coast to the southward,—and of attempting several other schemes, none of which, on reflection, afforded a probability of preserving life, in the event of their not falling in with their ship. It is scarcely possible for a person who has not been in circum-

stances somewhat similar, to imagine the extent of their delight, when, in the night of the 13th, they discovered the Fame standing towards the land, and boldly penetrating the dangerous body of ice that intervened, for their rescue. Some of the people were already ill; one man declared that he could not have survived half an hour; and others were in the lowest state of despondency and weakness. Their junction with the Fame at this critical period, was a deliverance, of the providential nature of which, it was hoped, that some of them were not insensible. Unfortunately it fell calm when the ship was in this situation, and, before they could accomplish their retreat, the ice collapsed around, and closed them in.

On the 21st of August, the weather was almost constantly foggy. We renewed the operation of making-off, as soon as our coopers had prepared a sufficient number of casks. For the convenience of stowage, many of our casks had been taken down, and formed into "packs." The rebuilding, or setting up, of these occupies a great deal of time, and renders the closing operations of a successful fishery extremely slow and tiresome.

The following day, this tedious business was completed, and the ship once more put into order. This was a circumstance of great importance to me, as the greasiness of the decks, and

frequent instability of the ship, rendered me at once uncomfortable and anxious during the whole of the interval between the capture of the three whales, and the conclusion of the process of making-off.

Being greatly incommoded by ice of a formidable quality, we shifted our moorings, during this day, to three different floes. The last to which we made fast, was remarkable for its thickness and solidity. It was about a mile in medial breadth, of a flat uniform surface, and forty feet in thickness of solid ice. As this floe was little affected by the influence of a fresh breeze that at this time blew from the ENE, whilst the less ponderous sheets around obtained a sensible drift to leeward, it promised to afford us comfortable moorings, and to enable me to acquire a quiet night's rest, of which, for nearly a fortnight, I had generally been deprived. But the appearance of safety was entirely deceptive, as the events of another day,—a day of adventure and peril, will not fail to prove.

Friday, 23d August.—We had a heavy fall of rain in the night, with a fresh of wind at NE.: in the morning, about five o'clock, it veered to N., and increased to a hard gale. As, however, the wind was directly off the side of the floe, to which we were moored, we hoped to be able to ride out

the gale in safety. The first circumstance of difficulty was the sight of an iceberg " setting up" to windward, in a straight line for the ship. Perceiving, however, as it rapidly neared us, that it would pass across our stern if we could heave the ship a little a-head, we made the attempt, and succeeded. It passed within a few feet of the rudder; and, when at a very little distance, divided into two, and both parts upset with a terrible commotion. Had it broken against the ship, its effects might have been destructive. The fragility of icebergs, at this season, is well known, and their liability to break and turn over, quite notorious. In the summer of 1821 the captain of a whaler that had been wrecked in Baffin's Bay, wishing to make himself useful in the ship that he had fled to for refuge, offered to assist in fixing an anchor in an iceberg, to which it was expedient that the ship should be made fast. He was accompanied by a sailor to the berg, and began to make a hole for the reception of the ice-anchor; but almost the first blow that he struck with the axe, occasioned an instantaneous rent of the mass of ice through the middle, and the two portions fell in opposite directions. The captain, aware of his danger, the instant the ice began to move, ran up the division on which he was situated, in the contrary direction of its revolution, and for-

tunately succeeded in balancing himself on the changeable summit until it attained an equilibrium. But his companion fell between the two masses, and would probably have been instantly crushed or suffocated, had not the efflux of water, produced by the rising of the submerged parts of the ice, hurried him from between them, almost alongside of a boat that was waiting near the place.

The rain of the fore-part of the day, gave place, about noon, to hail, which was so sharp that it was scarcely possible to face to windward; and this was succeeded with an intermixture of soft flaky snow, that covered the deck to the depth of several inches. The wind, in the mean time, became more and more fierce, until it blew almost a hurricane. So long as the floe to which we were moored maintained its position, we rode in tolerable safety; but, as the wind increased, it began to "slue" or revolve, until it brought the ship alongside of it. As the fierceness of the gale, and the thickness of the weather, rendered it impossible for human exertion or care to keep a ship in safety under-way, surrounded as we were with ice in innumerable sheets, we determined to retain our hold of the floe as long as practicable; and we were encouraged in this resolution, by observing that, about 4 P. M., the revolution of the ice had

ceased, whilst the ship yet rode " head-to-wind." To be prepared for all events, however, we close-reefed the top-sails, and stowed the courses; took out " springs" from the quarters, for casting the ship; had axes in readiness for cutting the hawsers, if necessary; and made every other arrangement for providing against ordinary casualties, which my experience in similar adventures could suggest.

About 6 P. M. the snow became so thick that we could scarcely see a hundred yards distinctly, and the wind was, if possible, more furious. Two small icebergs now appeared setting towards the ship; but as they were not of a magnitude sufficient to endanger us, without auxiliary pressure, we quietly awaited their approach. The first, which was about thirty-six feet above the level of the sea, struck the ship on the starboard quarter, and turned her broadside to the wind; it then slipped clear, after obliging us to lower three of our boats to preserve them, without occasioning us any damage whatever. The second iceberg approached us with more alarming rapidity; but as we had not the power of getting clear of it, we were obliged to receive the shock upon whatever part of the ship it might chance to fall. It came in contact with the rudder, and slightly bruised one of its timbers; then grazing the ship's quarter and broadside, it passed forward to the bows,

and being fortunately kept from close contact aloft, by a tongue projecting from its base, it cleared all our boats, and occasioned only a trifling injury to some of the skeeds in its progress. At this juncture, when the ship was so much involved with icebergs as to render casting off impracticable, had the state of the weather permitted it, two floes came in sight from different quarters. One of these appeared to be rapidly closing upon us from the west, and the other from the south, which, with the floe that we were moored to, occupying the eastern quarter, almost completely locked us in. To secure ourselves as far as possible against the crush, which now appeared certain, we fastened, by a hawser, a large heavy piece of ice ahead of the ship, where the floes threatened the first contact; with the view of subjecting the interposed mass to the pressure, and with the hope of being then defended from partaking of it. The last iceberg that passed yet annoying us, we slacked the ship astern until it was quite clear ahead, and had placed itself across the bows, with the deceitful appearance of affording an additional safeguard. As we became more and more exposed to danger from the floe setting up from the southward, as we slacked the ship down, and at the same time retreated from the protection the pieces of ice ahead seemed to promise,—it

appeared to me that the nearer the ship was kept to these, so long as they were fairly clear, the greater would be our safety. But an unfortunate revolution among the ice disappointed these expectations, and overcame all our precautions. The first shock of the floes was sustained, as we had expected, by the mass of ice that was expressly placed near the ship for the purpose, and for some time afterwards, all things seemed quiet and safe. Suddenly, however, the pressure was renewed, in consequence, it was presumed, of some new stoppage to the drift of the floes, with tenfold violence. Our barrier was squeezed deeply into the floe, and prodigious blocks of ice were broken off, and reared up by the pressure. While we contemplated these mighty effects with much anxiety, the berg ahead of the ship began a revolving and a retrograde motion, so quick, as to overtake us before we could get the ropes off to slack astern, and suddenly nipped the ship on the larboard beam and bow, against the floe by which we rode. The force was irresistible. It thrust the ship completely upon a broad tongue, or shelf under water, of the floe, until she was fairly grounded, and continued to squeeze her rapidly up the inclined plane formed by the tongue, until the ice came in contact beneath the keel. This was the work of a few moments, and in ten minutes all was again at rest.

When the pressure ceased, we found that the ship had risen six or eight feet forward, and about two feet abaft.

The floe on the starboard side was about a mile in diameter, and forty feet in thickness, having a regular wall-side of solid ice, five feet in height above the sea; on the tongue of this the ship was grounded. The iceberg on the larboard side was about twenty feet high, and was in contact with the railing at the bows, and with the gunwale and channel-bends amidships. This berg was connected with a body of floes to the westward, several leagues in breadth. The only clear place was directly astern, where a small interstice and vein of water was produced, by the intervention of the bergs. Any human exertion for our extrication, from such a situation, was now in vain; the ship being firmly cradled upon the tongues of ice, which sustained her weight. Every instant we were apprehensive of her total destruction; but the extraordinary disposition of the ice beneath her, was the means of her preservation. The force exerted upon the ship, to place her in such a situation, must evidently have been very violent. Two or three sharp cracks were heard at the time the ship was lifted, and a piece of plank, which proved to be part of the false keel, was torn off and floated up by the bows; but no serious injury was yet discovered. Our situation, however, was

at this time almost as dangerous and painful, immediate hazard of our lives excepted, as possible. Every moment threatened us with shipwreck; while the raging of the storm,—the heavy bewildering fall of sleet and snow,—and the circumstance of every man on board being wet to the skin, rendered the prospect of our having to take refuge on the ice most distressing. Our only hope of safety in such a calamity, was the supposed proximity of the Fame. Yet we well knew that she must also be in danger; and, perhaps, in a situation as bad as our own. We could look to no other refuge; since we had reason to apprehend, that the whole of the Greenland fleet, with the exception of a single ship, had left the coast, and proceeded either homeward, or at least to the skirts of the ice. Even in the event of the safety of the Fame, as she was not near us, nor had we any conception of her position, we could not have obtained protection from her before a change of weather; and, in the mean time, exposed to such a storm, without the possibility of erecting tents for our shelter, it was to be feared that many of our crew would have sunk under the inclemency of the weather. Impressed with this apprehension, the people not being required to attend to any duty in the immoveable state of the ship, employed themselves in making preparation for the catastrophe that seemed to await us.

We remained in this state of anxiety and apprehension about two hours. On the one hand, we feared the calamity of shipwreck; on the other, in case of her preservation, we looked forward to immense difficulties, before the ship so firmly grounded could be got afloat. While I walked the deck under a variety of conflicting feelings, produced by the anticipation of probable events, and under the solemnizing influence natural to a situation of extreme peril, I was suddenly aroused by another squeeze of the ice, indicated by the cracking of the ship and the motion of the berg, which seemed to mark the moment of destruction. But the goodness of the ALMIGHTY proved better to us than our fears. This renewed pressure, by a singular and striking providence, was the means of our preservation. The nip took the ship about the bows, where it was received on a part rendered prodigiously strong by its arched form, and the thickness of the interior "fortifications." It acted like the propulsion of a round body squeezed between the fingers, driving the ship astern, and projecting her clear of all the ice, fairly afloat, with a velocity equal to that of her first launching!

Fortunately the ropes and anchors held until her stern-way was overcome. As soon as she was brought up, our attention was instantly turned to

more dangers; and our previous state of anxious inaction instantly gave place to the most persevering and vigorous exertions for our preservation. Hitherto, while the floes were in contact about the ship, there had been a clear vein of water leading directly to leeward, in which it appeared that the ship might ride, under the protection of the icebergs, in safety. But two points of the bounding floes, betwixt which the ship lay, were now observed to be rapidly closing upon us, and threatening us with another squeeze. As the channel running to leeward was so narrow, that there was not room to swing the ship so as to get under-way, our only chance of safety depended upon our being able to drop to leeward with a considerable velocity *. Though we had little hope of accomplishing this under such a gale, without some of the ropes or anchors giving way, which would have been almost certain ruin, yet having no other resource, we were obliged to undertake the risk. With all imaginable care and

* To *drop* a ship is a nautical phrase, expressive of the operation of removing under the simple action of the wind, by veering out the ropes by which the ship is moored. Thus, in the present example, the wind, blowing directly down the channel betwixt the two floes where the ship was moored, forced her to leeward along the channel, whenever the ropes were slacked.

prudence, we began to slack astern, using two hawsers on an end for greater despatch; these carried us past the nearest points, at the moment when they had closed within two or three feet of the breadth of the ship. In five minutes they were in contact, and some hundreds of tons of ice gave way, and squeezed up under the pressure. Before another rope, that had been employed in aid of the hawsers, could be disengaged from its anchor, and replaced near the ship for continuing our movement to leeward, other two points of the floes appeared astern in rapid approximation. Remaining where we were, though but for five minutes, was inevitable shipwreck; and to trust to the strength of a warp of five inches circumference, the only mooring rope we had now at command, afforded but small hope of a better fate; for, in the event of the ship breaking adrift, as there was not breadth between the floes to swing, she must fall astern with such a shock against the ice, as could scarcely fail to be destructive. Possible safety, however, was preferred to certain destruction. We now slacked astern by the warp fastened to the second hawser, which, to our astonishment and delight, sustained the prodigious strain; and although it was not capable of bringing the ship up, yet it so far resisted her velocity, that at the moment when it came to an end, a hawser, that was

meanwhile hauled on board, was fastened to another anchor placed for its attachment, whereby the motion astern was suspended. On this occasion, we again escaped the nip by only three or four feet, and the floes came in contact with unabated violence, scarcely a ship's length ahead. But more and more approximating points appearing astern, we dropped the ship the whole length of our last hawser, with the hope of avoiding them; but it only carried us clear of the first. We were then brought to a stand; for the other hawsers and warp, forming a continuous line of 700 yards in length, got entangled, and nipped by the floes, so that we were under the necessity of slipping the end and fastening it to the ice. As we had now no rope left of sufficient strength with which to shift the hawser, our progress would have been suspended, and our previous exertions rendered nugatory, had we not brought into use a small mooring chain that was fortunately at hand. Before the hawser was again fastened, however, the hook of the chain broke, and the ship was entirely adrift. But it providentially happened, that the people who were on the ice having seized upon the end of the hawser, were enabled to cast it over an anchor that an officer was engaged in setting, at the very last moment that could have served for our preservation! The severe strain to which this

hawser was subjected, broke one of its strands, and called for the instant renewal of the chain. This was a most narrow escape; but there was another that succeeded which was equally striking. When slacking astern by the hawser, the ship swung alongside the eastern floe into a little bight, and the rudder unfortunately caught behind a point which projected some feet to windward. The floes were so nearly close, that we had not time to heave ahead, had this measure been practicable under such a storm. We were in a state of extreme jeopardy. One of the after-sails was instantly loosed, and hauled over to the starboard quarter; the action of this, happily coinciding with a momentary diminution of the wind, when the tension of the ropes drew the ship ahead, turned her stern clear of the point. We instantly slacked astern and dropped beyond this danger.

It might be tedious to describe all the subsequent exertions made for our deliverance, under the repeated difficulties we encountered. These difficulties will be readily appreciated by persons acquainted with the management of a ship, when they are informed, that our movements, to a considerable distance, were effected by means of a stranded (or partly broken) rope, and a doubtful chain, at a time when the wind blew with such violence, that I could scarcely make myself heard with

a speaking trumpet, from the companion to the windlass. It may be sufficient to say, in addition, that by a most striking and remarkable providence aiding our exertions, suggesting precautions, and timeing our various removals, we continued to drop the ship down the narrow dangerous channel betwixt the floes, until their approximation ceased. Thus was the ship most miraculously preserved, throughout a removal of a mile, under the most dangerous, difficult, and discouraging circumstances, when there was not a single spot in all the distance that we accomplished, in which a ship remaining five or ten minutes after we left it, could have been saved from being crushed. The reason of this was evident. The two floes betwixt which we were involved, though full of little prominences or points, were, in the main, of a circular form. As these were revolving against each other in contrary directions, like the action of a pair of toothed wheels, when one is put in motion by the other, every part of the circumference of each floe became in its turn the point of contact.

These anxious and energetic operations continued until midnight, when we obtained the first respite, on observing that the floes had ceased to revolve. But we were still in jeopardy. A large body of ice having been drifted by the violence of

the gale against the floe that we were moored to, urged it so rapidly to leeward for some time, that the southern ice, to which we were now exposed, began to set up with alarming velocity. Nothing dangerous, however, came in the way during the continuance of the gale; and, to our great comfort, about 4 A. M. the weather cleared up, and immediately began to moderate.

By this time our people were so much exhausted by fatigue, that on undertaking the recovery of our ropes, which cost a labour of some hours, several of our able-seamen withdrew from their duty, making a sacrifice of their character and hopes of preferment, and exposing themselves to the loss of their wages, for the sake of the indulgence in a little rest.

After recovering all our ropes, we cast-off from this place of peril, and made sail to the eastward, into ample room. We were rejoiced to find, that the ship was not rendered leaky, by the coarse treatment experienced; and that no damage, either inside or without, of any consequence, could be discovered. The Fame was not in sight when we got under-way, and I was greatly anxious respecting her. Shortly afterwards, however, to our great satisfaction, the Fame was discovered standing to the westward, and apparently safe; but not so the Dundee, the only other ship near,—this vessel,

when seen, proving to be dismasted. The Fame joined company with her, and was observed to be employed in towing her out from among the land-floes.

We joined both these vessels in the night, and learnt that the Fame, like ourselves, was exposed to considerable danger; but fortunately, being able to keep fast to the ice all the gale, escaped without any material damage. The extraordinary violence of the wind was fully proved (had such proof been necessary), by its effects on the Dundee. This ship was under-way at the commencement of the gale, and, under close reefed topsails, foresail, &c. attempted to get to the eastward of some floes under her lee, for the purpose of obtaining a wider navigation, at a greater distance from the land. The main-staysail and mizen-topsail blew to pieces, and shortly afterwards the bowsprit was carried away, and was followed by the foremast and main-topmast. In this disabled state she drifted between two floes. Fortunately falling under the lee of one of them, into a sheltered situation, she was secured to the ice, and wonderfully preserved. At the conclusion of the gale, they made a signal of distress, that soon brought the Fame to their assistance, which dragged them out of their hazardous position among the land-floes, into a commodious

opening, a little to the eastward. They lost all the wreck of their masts, sails, and rigging, and some of their boats; but the hull of the ship being uninjured, the crew now commenced, with the help of materials from the Fame, to refit with jury-masts.

On the 25th, being Sunday, we made fast, along with the Fame, for the purpose of honouring the Sabbath day. Our recent extraordinary deliverance from threatened shipwreck, called for our united thanksgivings to Almighty God; and as the circumstances were most strikingly providential, they produced an impression on the minds of the sailors, of a very devotional and solemn description. The weather was fine and calm, with bright sunshine; so that we experienced no interruption to our religious services.

August 26th.—As we had drifted considerably to the southward, in the late gale, I obtained a new and important station, for the conclusion of my survey; and as the weather fortunately continued calm and clear, I obtained the requisite observations with all desirable accuracy. Our observed latitude was 71° 24′ 40″; longitude by chronometer 20° 56′; being a position intermediate between my last station and the most northerly of my former stations on the Liverpool Coast. This enabled me to connect the surveys of the

20th of July and the 20th of August, in the most satisfactory manner. Our distance from the land was about sixteen miles, Cape Gladstone bearing WNW ½ N., true; and a headland named after Mr JOHN TOPHAM, bearing due west. The Liverpool Coast was in sight as far down as Roscoe Mountains, and even the land about Cape Brewster, distant seventy-five miles. Two small islands were discovered lying off Cape Gladstone. The most northerly was named MURRAY ISLAND, after my respected friend Admiral Murray; and the other REYNOLDS ISLAND, in compliment to different respected individuals, descendents of the late Mr Richard Reynolds, of Bristol, universally known and esteemed for his extraordinary philanthropy *.

The inset of the current, found to prevail so strongly near Davy's Sound, was likewise observed in our present situation, though clear of all large inlets. On sounding, we found the current setting due west, or directly towards the land, at the rate of a quarter or half a knot. The depth was 185 fathoms: temperature at the bottom 32°; at the surface the same.

* Some other names, applied in the chart to the northern part of the Liverpool Coast, were derived from different friends, chiefly resident in Manchester.

The great hazard we encountered in the gale of the 23d, with numerous tokens observed that were indicative of approaching winter, warned us to quit a coast which was daily becoming more and more dangerous. In the early part of this month we experienced the heat of a British summer; and the sea, in many places, was covered with birds. But the land had already received its mantle of snow, and many of the birds had retreated to their winter quarters. This was particularly the case with regard to the little auks and guillemots,—the former of which, a few weeks ago, were seen in innumerable quantities, either feeding in the water, or taking their daily flight towards the sea in the morning, and towards the land at *night*,—but now scarcely one of either species was to be seen.

Another intimation of approaching winter, to which we are very little accustomed in the Greenland whale-fishery, was the setting of the sun, and the rapid shortening of the days. On the 2d of this month, it was observed that the sun was above the horizon at midnight; but now we had seven hours thirty-six minutes betwixt sun-setting and sun-rising, with an increase of ten minutes in the length of each succeeding night. Hence the shortening of the days was so rapid as to be almost perceptible between one day and the

next, without the use of a watch. Added to the gloom common to the night, in the absence of the moon, we experienced the inconvenience of extraordinary darkness, amounting almost to a total want of light, produced by the general prevalence of hazy or foggy weather. This circumstance greatly augmenting the danger of our present situation, with little prospect of farther success in the fishery to counterbalance it, induced us to decide upon leaving the coast of Greenland with the first opportunity. According to this determination, we made sail in the evening, a breeze having then sprung up from the north-east, and proceeded to the eastward, in company with the Fame and Dundee,—the latter ship being, by this time, tolerably well refitted with jury-masts, and furnished with every required material and assistance that the Fame, which principally attended her, could supply.

CHAPTER XII.

RETROSPECTIVE VIEW OF RESEARCHES MADE UPON THE EASTERN COAST OF GREENLAND.—EXTENT SURVEYED.—MODE OF CONDUCTING THE SURVEY.—COMPARISON WITH PREVIOUS CHARTS.—GENERAL CHARACTER OF THE COUNTRY.—MOUNTAINOUS.—PERFORATED WITH INLETS.—PROBABLY AN ASSEMBLAGE OF ISLANDS.—SOME OF THE INLETS SEEM TO PASS THROUGH THE COUNTRY INTO BAFFIN'S BAY.—PRODUCTS OF THE COUNTRY.—INHABITANTS STILL EXIST.—THEIR NUMBER CONSIDERABLE.—EVIDENCES OF AN ADMIXTURE WITH CIVILIZED NATIONS.—CURRENTS OF THE GREENLAND SEAS.—DANGERS OF THE AUTUMNAL STORMS.—STATE OF THE WEATHER.

BEFORE I take my final leave of the coast of Greenland, I think it may be proper to give a retrospective view of the investigations and discoveries made, which will afford me an opportunity also of adding some general descriptions that could not be conveniently introduced in the course of the journal.

The trigonometrical operations of the 20th and 26th of August, connected the surveys made in this interesting region, so as to complete a continuous line of coast, with the exception of some in-

lets apparently interminable, included between the latitudes of 75° and 69°. The extent surveyed, measured, in a waving line from headland to headland, (which is the distance that a vessel would run along it, sailing parallel to the shore,) is about 400 geographical miles; but, if measured so as to include all the coast delineated, in its various windings and sinuosities, the extent amounts to nearly 800 miles.

Nearly four-fifths of this extent was laid down from intersecting bearings, and the remaining one-fifth was projected from single bearings, with estimated distances. About one-half of the whole extent, the part included between latitude 69½°, and latitude 72½°, was surveyed at a convenient distance from the shore; but the other half, though partly derived from intersecting bearings, was surveyed at such a distance as to render the detail of the coast somewhat uncertain. An inspection of Plate III., however, containing a representation of the coast, on the northern limit of the survey, from Gale Hamkes' Land down to Hudson's Hold-with-Hope, will, I think, give satisfactory evidence, that the coast was in general so bold and well-defined, as to afford sufficient opportunity for obtaining a good general survey. Should there happen to be any very low land, indeed, along this coast, I acknowledge that we were

too far distant to see it; but, as no land of this description occurred through an extent of 200 or 300 miles of coast, that we had an opportunity of closely examining, there is reason to believe that the northern coasts, which had a similar character and general elevation, is also entirely mountainous.

In the course of this survey, I employed above fifty stations *, chiefly determined astronomically, and made use of nearly five hundred angles or bearings, besides two or three hundred more, for ascertaining the variation and deviation of the compass.

The principal instruments employed in this business, were azimuth compasses, sextants, and a chronometer. The angles and bearings were generally derived from observations made with an azimuth compass, on Captain Kater's principle, which was found to answer so admirably, that, in moderate weather, no other instrument was necessary. All the magnetic observations, whether for

* In the general chart which accompanies this volume, the principal part of these stations are laid down, for the purpose of shewing the nature of the opportunity that I had for carrying on the survey; and a distinction is made in the shading of the chart, which shews, by inspection, whether the position of the land was determined by intersecting bearings, by single bearings with estimated distances, or by investigations in the boats.

determining the bearings of the land, or the azimuth of the sun, were taken at the mast-head, because this was the only part of the ship where compass-bearings could be relied on. In every other part of the ship, indeed, that could be conveniently resorted to, there was so much "local-attraction," or "deviation," that observations taken therein, with the magnetic needle, were useless. During boisterous weather, when the mast was so unsteady as to prevent the employment of the azimuth-compass in the crow's-nest, all required angles were taken with a sextant, and the bearings derived from them, by connecting one of the series with the angular distance of the sun. The longitudes were chiefly determined by the chronometer, its rate being corrected by subsequent observations made on known coasts,—by positions formerly determined,—by lunar observation,—and by a comparison with another chronometer. Only two opportunities for obtaining lunar observations occurred during the voyage. One of these was taken advantage of; but, on the other occasion, I was unfortunately on shore at the time the moon appeared, which set before I returned on board, and never rose again during the lunation. Sometimes, when the sun was invisible, both latitude and longitude were determined by the bearings of two objects, the correct positions

of which had before been laid down; and occasionally the same results were obtained, by observing the bearing, and measuring the angle subtended by any cliff or mountain whose elevation had previously been ascertained.

In many of these investigations and operations, I laboured under great disadvantages, as not only all calculations, but also all observations, of every description, devolved upon myself, not having a person among my ship's company who could be depended upon to take a bearing or an angle; nor even a set of altitudes, either for determining the longitude by the chronometer, or the variation, by the sun's azimuth. Hence in finding the variation, I had first to take the altitude of the sun, and mark the time by my watch, and then to ascend the mast, and take the azimuth from the crow's-nest. This process necessarily involved me in a troublesome calculation to ascertain the change of azimuth for the elapsed interval. When the interval, however, happened to be very short, an allowance of a degree of azimuth for every four minutes of elapsed time, was sufficiently accurate; but, in most cases it was necessary to resort to calculation for this correction. In observations for the longitude, by chronometer, I observed the time, took the altitudes, and noted them down; and, in lunar observations,

I took the moon's altitude,—the distance between the sun and moon,—noticed the time,—and registered the whole of these data,—being only assisted in the altitude of the sun, for calculating the effects of parallax and refraction: and even this I was obliged to repeat afterwards, for obtaining the apparent time at the ship. From extensive practice, however, these difficulties, in a great measure disappeared, (at least so far as affected the correctness of the different observations), and the same results, as to accuracy, were obtained as if I had had the usual number of experienced assistants.

As a part of the eastern coast of Greenland was discovered by Henry Hudson, in 1607, (from latitude 72° to 73½°) and as some insulated points have been seen by some of the whalers within the last few years, it is difficult, and indeed impossible, to ascertain what proportion of the researches of this voyage is original discovery. The position and form, however, given to this coast in our best charts, are so different from the reality, that the greater part, if not the whole extent of these investigations, may perhaps be considered as a *new country*. The errors in the longitude prove to be very great. It has already been noticed, that the land in the 75th parallel of latitude differs from the meridian given to it by the best charts, about 7°,

and from that given to it by the charts published for the use of the whale-fishers, about 820 miles of longitude, or nearly 14°. In most of our maps, the eastern coast of Greenland, between Hold-with-Hope, in latitude 73½°, and the Arctic Circle, or the latitude of 66½°, trends towards the south-west, in an irregular continuous line, drawn apparently according to the fancy of the hydrographer. Whereas the true position of at least one-half of this interval, is very nearly north and south, and is pierced with a number of such wide and extensive inlets, as could not possibly have been overlooked, had the land ever been examined. It may be proper here to acknowledge, however, that, in some of our nautical charts, the same continuity of the coast is not laid down; but then the errors, in the longitude and direction of the coast, are in these charts excessive. The only inlets that bear any relation to the reality are three *fiords*, laid down in the latitude of 72° 15′, which occupy a parallel not very different from that of Davy's Sound, or Mountnorris Inlet. But, as these are made to penetrate either north or north-west into a coast running east and west, instead of having a westerly direction in a coast that actually lies almost north and south, the difference becomes so great, that they cannot, I conceive, be considered as the same; especially as

no one who had seen the real inlets could possibly have mistaken west for south, and north or north-west, for west or south-west. At any rate, a mere inspection of the annexed comparative map (Plate VIII.), giving the position of the land by the nautical charts,—by the best maps,—and by the recent surveys, will prove that no correct description of this coast was hitherto given, and that the insular structure of the land was altogether unknown *.

The general character of this country, from one extremity to the other, of the extent of my researches, is barren, rugged, and mountainous. The average elevation of the coast is about 3000 feet. Several mountains were measured trigonometrically about the Liverpool Coast, and near Cape Brewster, some of which reached 4000 feet; and Werner Mountains, in Davy's Sound, were esti-

* These remarks do not extend to an assertion that the greater part of this coast has not, within the last two or three years, been seen by other whale-fishers as well as myself. My Father, indeed, in the summer of 1821, saw the land generally, from latitude 74° to 70°; and, in a former voyage, traced the coast, at a distance, from latitude 71° or 72°, down to 68° or 67°: so that, although the survey and description of this coast are entirely original, it is impossible to say what proportion is original discovery.

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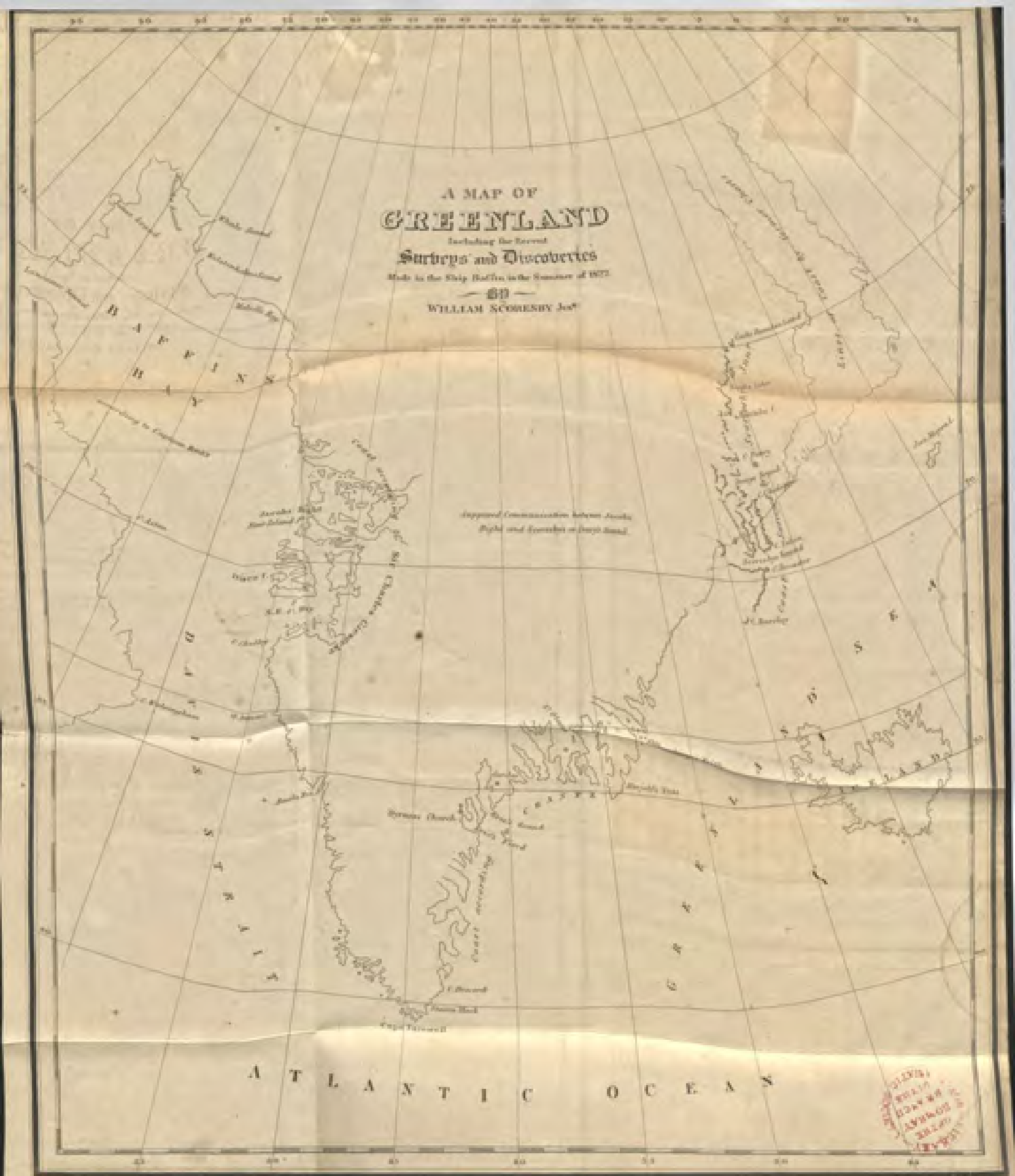

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mated, by the distance at which they were seen, and the elevation they assumed above the ordinary mountains, to be at least 6000 feet. The particular description of the beautifully serrated group on the Liverpool Coast, and of the interesting chain on the southern side of Scoresby's Sound, will serve to illustrate the prevailing appearance of the whole range along the coast.

This coast is so deeply and frequently pierced with inlets running to the westward, and having internal ramifications stretching either to the northward or the southward, that there can be little doubt of the country, to the extent seen, being an assemblage of islands. On looking at the map towards the portion best surveyed, included between Cape Parry and Cape Brewster, scarcely a doubt, I think, will be entertained, that such is the structure of the country. Thus, Hurry's Inlet having been examined from the south, as high as a place that was called POINT CONSTABLE, —and a corresponding inlet being observed to extend from the north as far as another point, only five or six leagues from the former, that was named CAPE MACKNIGHT, we have almost the strongest intimation, short of actual examination, of the continuance of Hurry's Inlet throughout. In this case, the Liverpool Coast becomes an island. In like manner, the corresponding direc-

tions of Hall's Inlet and Fleming's Inlet, are strongly indicative of the insularity of Jameson's Land. And there is seen to be a similar indication, with regard to the insularity of the country of which Cape Brewster forms the eastern promontory, by the direction pursued by Scoresby's Sound and Knighton Bay.

But in addition to this general structure of the land about the coast, there are good reasons for believing that the whole country of Greenland is likewise a great compact archipelago. One argument in support of this opinion, is the apparently interminable extent of some of the inlets. It has been shewn, (page 200. of this volume), that Scoresby's Sound and Hall's Inlet, penetrate at least to the depth of ninety miles towards the west. Now, on the opposite coast of Greenland, it is worthy of remark, there is a corresponding inlet (Jacob's Bight) penetrating towards the east, the extent of which, to all appearance, is boundless. According to Sir Charles Giesecké, whose manuscript map I have been favoured with a sight of, Jacob's Bight, lying nearly in the same parallel as Scoresby's Sound, stretches about 150 miles to the eastward, beyond the general line of the western coast; and there expands into an apparently interminable sea. The interior structure of this Bight, which is laid down in the compar-

ative map from Sir Charles Giesecké's chart, is such, that there seems to be the greatest probability, that it continues through the country to a conjunction with Scoresby's Sound; and, perhaps, also, with some of the more northern inlets. The distance across, beyond the observed extent of these inlets, is about 380 miles, as measured upon the map. But this is not the only place where the western coast is broken by inlets. On the contrary, Sir Charles Giesecké found, that, to the northward of Disco Island, as high as latitude 76½°, the coast is not continuous, as at a distance it seems to be, but consists entirely of a range of islands.

These facts, however, though they render the assumed opinion respecting the structure of Greenland extremely probable, must be acknowledged to leave it still in a conjectural condition. The statement of another circumstance, however, relating to the current, will carry the opinion, I should think, almost beyond a doubt. Wherever a current is observed to set regularly into a sound or other inlet, carrying floating bodies along with it, and not returning them back again, it is evident such inlet must have another, or interior communication with the sea; otherwise, the perpetual inset of a body of water would produce such an accumulation within, as not only to prevent any

further influx, arising from an accidental cause, but also to occasion a reflux of the portion of water thus urged above its level. Now, it was observed during our stay in the neighbourhood of Davy's Sound, that there was such a decided and constant inset as we have just supposed. As this inset was not returned by Mountnorris Inlet, nor by any other opening immediately to the southward of Davy's Sound, it is evident, that the influx of water must have been carried off by some interior channel connected with the ocean. The certainty of this inset rests upon the following facts.

When we first approached the land opposite to Traill Island, we had a clear communication with the shore. The ice previously floating at a distance to the eastward, however, soon began to set in, not by the influence of the wind, because the wind blew directly along shore (or rather off shore as otherwise), until a body of ice had accumulated many leagues in width. The navigation was clear to the very beach at Cape Moorsom, on the 12th of August; but on the 15th, the quantity of ice that had set in, prevented us getting within fourteen miles of Traill Island; and on the 20th, in the opening of Davy's Sound, we were forced off to the distance of twenty miles from the land.

On the 26th, the day of our departure, our distance, at the edge of the land-ice, when clear of the principal indraught, was sixteen miles. Now, this must have been the mere action of the inset, since the wind, which was the only other known cause that could have produced such an effect, was almost constantly northerly, blowing in such a direction, indeed, as was calculated to set the ice off the land rather than in-shore. Another fact, the result of a similar influence, affords the same conclusion. In the interval betwixt the 14th and 26th of August, we had frequent occasion to moor the ship to a piece of ice. So situated, we ought to have kept at a uniform distance from the land, while the wind blew along the coast; but it was invariably observed that we constantly set in towards land; so that in every instance when we cast off, we were obliged so to do, because of our coming into contact with the land-ice; though, in some cases, we ran off to the distance of several miles before we made fast.

The products of this country, as far as our examination extended, in the departments of mineralogy, botany, and zoology, have been already noticed; and as they form three distinct articles in the appendix, any particular observation here on these subjects becomes unnecessary. One remark, however,

respecting the birds frequenting this region, may be admissible. As soon as the ice begins to clear away, the coast is visited by prodigious quantities of birds, particularly roaches or little auks, which find here in the water, not only an abundant supply of shrimps and other insects suitable for their food, but on the land, that quietness and warmth that are congenial to their habits, and suitable for their necessities at the time of incubation. They get to the coast probably in May or June; and leave it towards the end of August or beginning of September. They then migrate to the southward, taking advantage of a northerly gale for assisting their flight.

The migration of aquatic birds may be easy, because they can rest, when necessary, by the way. But how such small birds as the plover, red-pole, ice-bird, &c. accomplish the passage, is difficult to explain. It is evident, that when these birds are on their way, if a change of wind should occur, in such a direction as to keep them off the coast to which their flight is directed, they must perish. We often, indeed, in the spring of the year, observe these birds alighting about our ships as we approach the ice or arctic lands; and not unfrequently find them in a state so exhausted by fatigue or want, as to permit themselves to be caught, and taken up alive.

We were not so fortunate as to meet with any human beings in a living state,—though the traces of their recent existence were innumerable. These traces consisted of numerous huts, hunting utensils, portions of sledges, bones that had been divided artificially, domestic implements, and depositories of the dead, containing human skeletons, or even bodies, as I was informed, only partially decayed. In some instances, these relics were of such a nature, as to indicate a very recent desertion of the inhabitants. Such, in particular, was the intimation afforded by the fire-places containing ashes, which we found at Cape Swainson and on Traill Island. These appeared to be the remains of recent fires, perhaps of the preceding spring or summer; for it is scarcely probable that the light ashes of wood and moss could have long resisted either being washed away by the melting of the snow, or scattered about by the violence of the tempests. There is another evidence, though of a collateral kind, that may be mentioned, which would, I conceive, almost of itself establish the opinion of the present existence of inhabitants upon this coast, were any further proof requisite. Captain Johan Haacke, of the ship Patriot Gleojstein, a Bremen whaler, found a dead sea-horse (walrus), in the summer of 1820, within sight of the east coast of Greenland, in the latitude of 73°,

in which there were two harpoons, such as are used by the Esquimaux. These harpoons, which were found sticking in the animal, appeared to have been the cause of its death. From the state of the carcass, it was evident that the animal had not been long dead; and from the attachment of filaments of sea-horse skin to the harpoons, that had been used in the place of cordage, which were not yet decayed, it was further evident that these harpoons had not been long fastened *. Hence, there could be no doubt but this sea-horse had received the harpoons found in its body, from the hand of some inhabitant of the east coast of Greenland; and the probability was, that the time when the attack was made, was within a few days of that in which the animal was found.

From the evidently recent character of some of the remains found, it was not improbable but there might be existing inhabitants even on some of the parts at which we touched. Doubtless, the sight of such an extraordinary object to them as a ship,

* This circumstance was communicated to me by an intelligent navigator of Bremen, Captain Haacke, of the ship Bremen, and brother to the person who picked up the sea-horse. The harpoons were about four inches long. They were formed of bone, armed with iron. To one of them, a thong of hide, two fathoms in length, was attached, and to the other a similar thong, six fathoms in length.

would excite their alarm. It is most likely, that, to people who had never seen a vessel of any description, not even of the size of a boat, impelled by sails, an object of this description so perfectly under command, and capable of such velocity, would be mistaken for a living creature. If so, it would not be surprising, if any inhabitants that we might have been near, should have fled on our approach, and concealed themselves until we retired.

Perhaps, however, they had retired from these haunts that we visited, to some neighbouring districts, to which the seals, birds, and other animals, affording them subsistence, had retreated. All along this coast, where we touched, the fewness of the animals was remarkable; and this circumstance alone was sufficient to account for the desertion of the different hamlets that we discovered. The place of resort of the seals and other marine animals, is probably determined by the supply of food which the contiguous seas afford. Now, this supply, on account of the constant action of currents, is continually varying. But as the natives of such a country must be chiefly dependent on these animals for their subsistence, they must pursue them to whatever part they may retreat to, whether it be immediately on the sea coast, or whether it be in the depths of the great inlets, by

which the coast is so extensively pierced. Thus, wherever the seals are found along shore, there, we must suppose, the inhabitants would be met with. There is little to be gathered from the state of the hamlets discovered, as respects the time of their desertion. The huts being without roofs was no argument for their antiquity; because the framing being of wood, a material of extraordinary value in a country in which none is produced, would doubtless be removed, and carried away on the desertion of the hamlets by the inhabitants.

This country, barren and desolate as it is, appears to be by no means so thinly inhabited as might have been expected. The numbers, indeed, in the parts we examined, must have been very considerable. For it is worthy of remark, that we never landed, in any one instance, upon any coast having a southern aspect, and possessing the least portion of flat land near the beach, without finding traces of inhabitants; and sometimes such traces were met with, even on the coasts fronting the east and north. I believe there were but two or three places, out of the numerous landings that were made by myself, and by the captains and officers of the Trafalgar and Fame, in which no traces of inhabitants were met with.

Most of the relics of inhabitants discovered in this country were indicative of the people, by

whom they had been left, being Esquimaux. But there were some exceptions. The division of hard bones and the ivory of unicorn's horns, by drilling contiguous series of holes, is a process, which, as far as I know, is not usually practised by Esquimaux. Now, this was apparently the plan that these people invariably adopted for cutting hard substances; and it may be considered as indicative of their having had some communication with people of other habits than those natural to the Esquimaux. Another circumstance, of a still more striking description, was the discovery of a wooden coffin in a grave at Cape Hope. This was almost a proof of some connection with Europeans; but it could not be satisfactorily determined, that, in this solitary example, the coffin was positively deposited by any of the natives.

On the whole, however, I conceive, that the remains we met with were not entirely Esquimaux. They indicated practices among the inhabitants that were in favour of the supposition of an admixture with some other nation,—doubtless the ancient colonies planted by the Icelanders. Hence, there is some reason to believe, that these colonies were not entirely depopulated,—that they are not yet extinct; though it is more than probable, that such of the colonists as outlived the "black-death," and the privation they must have suffered, when

their supplies were cut of, as it is said they were, by the descent of the polar ice, would cease to be a distinct people;—for being then reduced to the necessity of following the occupation of the Esquimaux, and of copying their manners, they would probably become gradually incorporated with the aborigines, until few traces of their original civilization remained.

The very extraordinary circumstances connected with these colonies of Icelanders, as regards their original planting,—flourishing condition,—reception of Christianity,—and their total separation from the world, since the beginning of the fifteenth century:—and the very important question respecting their fate, to which their early history gives rise, rendered researches for inhabitants on this coast an object to me of the most intense interest. Hence, it may readily be conceived what was the nature of my disappointment, when, on descending to the latitude of 69° 30′, where I was only at the distance of about seventy leagues from the site of the northern colonies, as given by Crantz, the main interests of my voyage obliged me to put about, and return to the northward. This disappointment was the greater, since I could observe no other hinderance to my penetration along the coast. I had reason, indeed, to believe, that could I have been justified in devoting three

or four weeks of my time entirely to research, I might have coasted the land down to Cape Farewell, and seen every station of the colonies by the way. In such an investigation I apprehended little difficulty. The chief difficulty, that of obtaining an entrance through a body of ice, 100 to 150 miles in width, which skirted and defended the coast, was already overcome; and as in the 70th, 71st and 72d parallels of latitude, we found the best navigation close in-shore, we had some reason to expect, that we should not, at any rate, have met with any thing insurmountable to obstruct our way to the southward, even down to the extreme promontory of Greenland.

The Currents upon the eastern coast of Greenland require a few remarks. The main current here, as in other parts of the Greenland and Spitzbergen Seas, sets to the south-westward, but there is a peculiarity along the coast of great importance to the navigator. This is a periodical offset and inset; the latter apparently occasioned by the action of the great inlets that intersect the coast in such various positions. It would appear, that there is an offset from the coast in the months of June and July, produced probably by the quantity of water poured into the sea on the melting of

the snow on the land. This offset it is, aided, perhaps, by north-west winds, which, in opposition to the general indraught of the sounds and inlets, clears the bays and coast, so as to afford access to the navigator in the height of summer. But as soon as the discharge of water from the mountains ceases, this offset appears also to cease, and an inset then takes place, which chokes up the bays and sounds with ice, and packs the whole of the body floating to the eastward in close contact upon the shore. The indraught which takes place at the close of the summer, as far as regards the present season, has been sufficiently proved; and the offset, or at least a suspension of the inset, is rendered equally certain, by the progressive separation observed to take place in the ice, and more especially by the vein of clear water found in many places betwixt the coast and the ice. The inset that occurs in the end of summer, renders the *West Land* fishing not a little dangerous at this season; and of this tendency the fisher should be always on his guard.

In addition to this danger to the navigator, of his being hemmed in by the closing ice, and of being detained throughout the winter, there is another, which greatly affects the safety of the fisher, and must not be forgotten. This is the prevalence (if we may judge by one year's expe-

rience) of heavy gales of wind in the month of August. These gales, which were probably the most violent immediately upon the coast, were, in this season, all from the northward; and were so prevalent, as to blow violently during six full days out of sixteen. In such gales, it is scarcely possible for human power to manage a ship, among ice, with any degree of safety, even in day light, and smooth water. And much less possible is it for the navigator to keep himself safe, when overtaken by them during the darkness of night, and in a turbulent sea. The situation of greatest peril, in the season when these storms occur, must be when the ships are about leaving the ice. If a ship be lost in smooth water, in the interior of the ice, there is a hope of the crew escaping, by the assistance of some other vessel; but if such a calamity should overtake them, in the tremendous swell that generally occurs at the edge of the ice in a gale, their situation, if not hopeless, must be perilous in the extreme *.

* Just as this sheet was about to be put to press, I received a letter from the Captain of a whaler, that was later on the fishing stations near the West Land than myself, giving an interesting account of the difficulties he encountered from the ice and weather, in the beginning of September, which fully corroborates the views above taken, of

The gales we experienced were always accompanied by a heavy fall of rain, hail, snow, or sleet; but most commonly rain. The quantity which fell exceeded, in a given interval of two or three days, any thing I ever before witnessed, either at sea or on shore. This circumstance is to be attributed to the action of partial winds. A stream of air proceeding entirely from the north, could not deposit any thing like the quantity of moisture that occurred, when passing towards a warmer climate. Most probably the wind aloft was from the southward, at the time of the northerly storms, by which we were visited; for an admixture of warm air, saturated with moisture from the south, with cold air from the north, could alone explain, on any reasonable principle, the vast and continued fall of rain that we experienced.

Though the sea shallows considerably on approaching the West Land, it seems to be in general very free from dangers. We saw some few rocks above water; but did not fall in with any that could be considered dangerous to shipping.

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the dangerous nature of these regions at this season. This communication being, I conceive, of importance to the whale-fisher, is, in substance, inserted in the Appendix, No. V.

The weather, in the months of June and July, is found to be particularly fine upon this coast; and the thick fogs with which the adjoining regions are visited, seldom remain long at a time on the land. We frequently observed, that when there was a thick "fog-bank" to the eastward, the weather was clear near the shore; and sometimes, in standing to the westward, we emerged as we approached the land, into a clear sky and bright sunshine. The total freeness from clouds of the atmosphere near shore, is often remarkable. The sun sometimes sweeps for days together, round and round the heavens, without, for a moment, being concealed by a cloud. The heat on shore, I have had occasion to remark, is, in such cases, very intense. The constant action of the sun, without the suspension of night, produces an influence on the vegetation, which exceeds, perhaps, any thing that elsewhere occurs even in the finest regions of the globe. The whole process of vegetation, from the first mark of vitality in the seed deposited in the ground, to the flowering and seeding of another series, is accomplished in a few weeks; and this process, it is evident, must be completed within the limited period, in every indigenous plant, or its species would become extinct.

The superior heat of the land, to that of the

sea, was most remarkable and striking. When the temperature on shore was not less than 70°, the thermometer on board of the ship, even near the shore in Scoresby's Sound, never rose, I believe, in the shade, above 40°.

CHAPTER XIII.

GET CLEAR OF THE ICE.—REMARKABLE COLOUR OF THE SEA.—EXAMINATION OF THE CAUSE.—INNUMERABLE ANIMALCULES.—STORMY WEATHER.—FAROE ISLANDS.—OBSERVATIONS ON THE CAUSE OF THE SUSPENSION OF CLOUDS.—APPEARANCE OF FAROE.—MAKE THE LEWISES.—TREMENDOUS GALE.—A PRINCIPAL OFFICER WASHED OVERBOARD.—DANGEROUS SITUATION OF THE SHIP.—REMARKS ON LIGHTS.—DIFFICULTIES OF THE NAVIGATION OF THE NORTH CHANNEL.—ARRIVAL AT LIVERPOOL.

Tuesday, 27th August.—A THICK fog having set in, in the night, we lost sight of the coast of Greenland, and never saw it afterwards. We pursued our reach all the day to the eastward, with an occasional tack, among fields, floes, and drift-ice. As we had a smart breeze, we made rapid progress, though a good deal bewildered with the thick fog that generally prevailed. About mid-day we fell in with a compact chain of floes, lying directly across our course, wherein, for some time, no passage whatever could be discovered. Fortunately the fog dispersed at a convenient moment, and the atmosphere exhibited fine *blinks*

of the ice that proved of the greatest consequence to us. By means of this reflection, which presented a distinct map of the various bodies of ice and intervening channels of water, we perceived that the chain of floes a little to the northward of us, was slightly divided, so as to promise to afford us a passage. In beating up to this position we had some difficult and narrow sailing; but, having reached the place indicated as an opening by the sky, we found a clear channel which conducted us through the chain of floes into a tolerably open navigation to the eastward. At sun-set, the wind blowing strong, we made fast, along with the Fame, to a small floe, for safety during the night. The Dundee unluckily parted company in the fog, by steering a more southerly course than that which we pursued.

The night was excessively dark and boisterous. All the ice was in motion, and annoyed us much. At day-break, a floe set up so near us, that we were obliged to get under-way. Though the weather was very thick, we continued our course to the eastward, under a brisk sail. At first we were greatly embarrassed by a body of floes, which, after putting the ships about, and obliging us to pursue every possible course, eventually afforded us a passage. The latter part of the day being less windy, and the sea more open, we advanced

with greater safety, though we were not so fortunate as to avoid all the pieces of ice in our way. We struck a blow against a tongue of ice, that occasioned some alarm, being received upon the part of the ship that had sustained some injury in the gale of the 23d, from whence another piece of false-keel was now disengaged. In the evening, the weather becoming extremely thick and dark, and the wind blowing fresh at SSE., we made fast to a loose piece of ice. But we were not permitted to remain long, as several lumps of heavy ice setting towards us, forced us from our moorings before day-light.

The fog was intensely thick the whole of the 29th; but the weather was fortunately calm. We now found that we were approaching the sea, both from a swell that penetrated and put the ice in motion, and from the loud roaring of the contiguous streams. We moored again in the night to several pieces of ice, no single piece about us being sufficiently large to make fast to. The night was so dark that the Fame, at the distance of 150 or 200 yards, was not seen for some hours. The sea was highly luminous.

August 30th.—A considerable swell setting in, and the ice accumulating greatly around us, our situation, in the event of a gale of wind, threatened to be a very critical one. Fortunate-

ly, in the forenoon, the density of the fog rather diminished, so that we could sometimes see a distance of half a league. We immediately cast off, having a breeze from the SSW., and, directed to windward by the loud roaring of the ice, came, after a few hours sailing, to the border of a compact aggregation of ice, that had every appearance of being the "sea-stream." As we continued plying to windward, along its inner margin, a break in its ranks was happily discovered, through which, along with the Fame, we succeeded in accomplishing a safe passage to sea. We now made all sail, and proceeded towards the south-east,—a course that soon took us entirely clear of the ice.

It was a great relief to my mind to be thus able to extricate ourselves, in safety, from the mazes of the polar ice, now rendered particularly dangerous by the boisterous winds of this season, and foggy weather, with dark nights, rapidly increasing in length. The comfortable feelings now excited by our comparative freedom from danger and anxiety, were not, I trust, unaccompanied by gratitude to a Superior Power for our constant preservation through a period of fourteen weeks, or, more exactly, a hundred days, during which we had been constantly encompassed by ice, at the distance generally of 100 or 150 miles from the sea, and often in circumstances of no ordinary peril.

It is not easy for a person, unacquainted with the navigation of the polar seas, to judge of the perpetual anxiety that the commander of a ship suffers, while involved among the crowded, extensive, and dangerous ices with which these regions abound. Among drift-ice, whenever the wind is high, ships are liable to receive blows that might be destructive: and, among fields and floes, when the weather is thick, so that the dangers of the navigation cannot always be discerned before it is too late, they are exposed to the closing of these irresistible masses of ice upon them, which are capable of crushing them in pieces in a moment. Ships under-way are almost perpetually exposed to one or other of these dangers: nor are ships moored to the ice by any means in safety, as our experience this voyage too powerfully demonstrated. Where floes abound, they are almost continually revolving and driving about in various directions, and frequently coming into mutual contact, with tremendous concussions. Different causes operate in bringing separate masses into contact, the combined influence of which, is often altogether incalculable. Thus, superficial currents, which are not uncommon, operate more powerfully upon light ice than upon heavy ice, so as to carry the former with greater velocity than the latter. The wind also, which acts upon all

ice, and gives it a universal tendency to leeward, operates more powerfully on light and hummocky ice, than on heavy and flat ice, so that the two former descriptions drift faster than the two latter. This general tendency of the ice is modified by the influence of other ice in connection or contact with it, also by the different forms which the sheets of ice assume, and by the position in which they lie, in reference to the wind. For instance: while circular sheets of ice, or sheets having a regular polygonal form, generally drift directly "before the wind,"—oblong pieces pursue a medium course between that of the direction of the wind, and the point to which the leeward extremity of their longest axis is directed. Hence it is evident, that the united effect of these various causes influencing "the set of the ice," can never be fully anticipated; although long experience in navigating the polar seas, will enable a person of observation, in most cases, to form a tolerably correct judgment of the safety or danger of almost any situation. Such being the anxieties and dangers attendant on the navigation among the northern ices, the relief that the captains of the whalers experience, when they get clear out to sea, must be in some degree appreciated. My Father has been heard to express his feelings on this subject, when fairly at sea, with the characteristic observation, that *his watch was out*.

The last day of August was foggy, with moderate variable winds. We steered principally SE. and S., but did not make much way.

"*Sunday, 1st September.*—The weather continued foggy. The wind was easterly. Our course SE b S., true. During this day's sailing, we passed through several veins or patches of a remarkable brown-coloured, or sometimes yellowish-green coloured, water, presenting a striking contrast to the blue sea around them. These patches ran in various directions, generally forming long streaks or veins, extending as far as the eye could discern the peculiar colour. Their breadth was small, seldom exceeding forty or fifty yards, and sometimes much less considerable. The separation of the two qualities of water, the ordinary blue and the brown, was generally well defined. The appearance of the brown patches was similar to that of the muddy water issuing from a large river, at its confluence with the sea. A water somewhat similar, I observed, in the month of July 1820, in the Greenland Sea; and Captain Parry notices water of a similar appearance, observed on his entrance into Davis' Strait, which he attributes to "the admixture of a large portion of fresh water, supplied by the melting of the snow and ice *." A bucket of the peculiar co-

* Journal of a Voyage for the Discovery of a North-West Passage, p. 7.

loured water passed through this day, was taken up and preserved for future examination.

The morning of Monday was hazy and squally, with dark threatening clouds, collected in the southern quarter. Beginning to blow hard, we were soon put under close-reefed topsails. At noon, however, the sky broke, and the wind suddenly moderated, and veered from E. to SSE. Deceived by the improved appearance of the heavens, without consulting the more faithful monitor, the barometer, we shook out the reefs of the topsails, and set top-gallant sails. But this moderation of the gale was of short continuance. It chopped again round to the E., and presently obliged us to reduce our canvas. Towards night, the barometer sank to 28.35.; which, being a greater depression than I had ever before observed on the homeward passage, indicated a hard gale. We made all possible preparation with this expectation; but fortunately, the easterly wind continued with us, and resisted the force of the storm predicted by the barometer, that evidently prevailed with prodigious violence at a short distance to the westward of us. Of this we had sufficient evidence in the rising of a "head-sea" so tremendous, that it greatly endangered our bowsprit and masts.

In the course of the day I obtained two or

three glimpses of the sun, which gave the latitude 68° 26′, and the longitude 11° 55′ W.

The brown-coloured sea-water, taken up on Sunday, was now submitted to examination under the microscope. The colouring substance had subsided, and combined into filaments and fasciculi of particles. These were evidently the remains of animalcules; but their exact form and magnitude could not be determined, on account of their close and intimate combination. From their general appearance, however, I make no doubt, but they are of a kind similar to that which gives the yellowish-green colour to the sea, observed on this and on a former occasion.

As the examination of the yellowish-green sea, discovered in the summer of 1820, in latitude 70° 34′, was conducted with great care, I shall give an account of those observations, which may serve to explain the cause of this and similar appearances in the waters of the ocean, better than the details of the imperfect examination now accomplished.

In the case to which I now refer, (namely, the observations made in the year 1820), the surface of the sea to an extent of several leagues, was variegated by large patches, and extensive streaks of a yellowish-green colour; having the appearance of an admixture with flowers of sulphur or mus-

tard. Whenever the ship passed through any of this peculiar water, the patch or streak was divided, and did not again unite; from which circumstance it appeared, that the colouring matter was quite superficial. Suspecting it to be of an animal nature, a quantity of the yellowish-green water was procured; and, on examination by the microscope, was found to contain animalcules in immense numbers. The larger proportion of these, consisting of a transparent substance of a lemon-yellow colour, and globular form, appeared to possess very little power of motion; but a part, amounting, perhaps, to a fifth of the whole, were in continual action *. Some of these being seen advancing by a slightly waving motion, at the rate of $\frac{1}{18}$th of an inch in a second; and others spinning round with considerable celerity, gave great interest and liveliness to the examination. But the progressive motion of the most active, however distinct and rapid it might appear under a high magnifying power, was, in reality, extremely slow; for it did not exceed an inch in three minutes. At this rate, they would require 151 days to travel a nautical mile. The Condur, it is generally believed, could fly round the globe at the equator, assisted by a favourable gale, in

* This kind resembled the animalcula represented in the "Account of the Arctic Regions," Plate xvi. Fig. 18.

about a week; these animalcules, in still water, could not accomplish the same distance in less than 8935 years.

Few circumstances among the minuter works of creation, have struck me with so much surprise, as the appearance of these animalcules, occurring in such myriads, in a sea perpetually covered with ice,—exposed to an average temperature fifteen degrees below the freezing point,—and subject to be frozen, on some occasions at least, during every month of the year.

The vastness of their numbers, and their exceeding minuteness, are circumstances, discovered in the examination of these animalcules, of uncommon interest. In a drop of water examined by a power of 28.224, (magnified superficies), there were fifty in number, on an average, in each square of the micrometer glass, of $\frac{1}{10}$th of an inch in diameter; and as the drop occupied a circle on a plate of glass containing 529 of these squares, there must have been in this single drop of water, taken out of the yellowish-green sea, in a place by no means the most discoloured, about 26,450 animalcules. Hence, reckoning sixty drops to a dram, there would be a number in a gallon of water, exceeding, by one-half, the amount of the population of the whole globe! It gives a powerful conception of the minuteness and wonders of

creation, when we think of more than 26,000 animals living, obtaining subsistence, and moving perfectly at their ease, without annoyance to one another, in a single drop of water!

The diameter of the largest of these animalcules, was only the $\frac{1}{1000}$th of an inch, and many only the $\frac{1}{10000}$th. The army which Buonaparte led into Russia in 1812, estimated at 500,000 men, would have extended, in a double row, or two men abreast, with 2 feet 3 inches space for each couple of men, a distance of 106½ English miles;—the same number of these animalcules arranged in a similar way in two rows, but touching one another, would only reach 5 feet 2½ inches. A whale requires a sea, an ocean to sport in;—about a hundred and fifty millions of these animalcules, would have abundant room in a tumbler of water.

About day-break of the 3d of September, the wind rather subsided, and encouraged us to make sail. But veering to the northward in the afternoon, it immediately began to blow. The bad weather so long predicted by the barometer, had, I began to hope, taken place in some other latitude, and passed us by; but it at length overtook us. The gale increased so rapidly, and attained such a degree of violence, that before we could

get in our canvas sufficiently, the "leach-rope" of the main topsail gave way, and the sail instantly split.

When the gale reached its height, the scene around us assumed a sublime aspect. The ship scudding before the tempest, attained a velocity of ten knots, which, accustomed as we had long been to smooth seas and slow removes, occasioned a peculiar excitation of feeling. The sea, however, rose to such an alarming height, that the pleasant sensations commonly excited by rapid motion, were considerably suppressed. Wave after wave followed us in rapid and varied succession, breaking and roaring along both sides of the ship, and occasionally throwing their sprays over the deck. The heavens were shrouded in a murky veil; the view of the horizon was intercepted, and the lower atmosphere obscured by the scum of the breaking waves.

Just as we had got the main topsail replaced, a heavy sea struck the rudder and broke the "tillar ropes." Scudding as we were at the time with the wind on the quarter, the ship necessarily "broached to;" but, such was her excellent adaptation and buoyancy, she did not receive a drop of water on board, under circumstances in which hundreds of ships have been dismasted and many have foundered. We lay to under a close-reefed main

topsail, until new wheel-ropes were arranged, and then pursued our course to the southward. At midnight we were in the latitude of the northern part of Iceland, a parallel that we crossed in a dark tempestuous night with considerable anxiety. The sight of the sun obtained on the 2d, gave, by the chronometer, a longitude a little to the eastward of this island; but as its rate had not yet been sufficiently determined, there was a possibility that it might not be correct. This suspicion, however, was fortunately not realized; and we ran safely during the remainder of the gale. It is observable, that the barometer, which had been at 28.35 for upwards of thirty hours before the commencement of the gale, began to rise the moment the gale attained its height. It rose about $\frac{4}{10}$ths of an inch, in a very short interval. This rising of the mercury, at the commencement of a storm, is a circumstance that I have frequently observed. It is not indicative, however, either of a short duration or an approaching cessation of the gale, for after such a rise, I have known many gales to continue for thirty or forty hours unabated.

The gale began to subside soon after day-light appeared, and at 8 A. M. we were enabled to make sail. The latitude at noon was 64°.56′; longitude 10°.7′ W. Towards evening, the barometer ha-

ving again fallen to 28.60, and the weather being dark, rainy, and threatening, we considered it prudent to make preparation for another gale. Fortunately, however, it did not reach us, though a mountainous sea, which arose from the westward, proved that it prevailed at no great distance.

On the 5th, the weather continued squally and unsettled, and we had heavy seas from different quarters. In the evening there was a faint appearance of the aurora borealis. Our course this day was SW. by the compass, which, it was expected, would take us clear of the Faroe Islands. But the wind in the night veering to the southward, obliged us to take a more easterly course, that brought us within sight of land at 10 A. M. It proved to be Myngeness, the most western of the Faroe Islands. Sights for the longitude being obtained near this land (which has been well surveyed by the Danes), I was enabled to ascertain the error of my chronometer. The longitude of Myngeness, as determined by the chronometer, was 8° 10′ W. instead of 7° 25′, the position given to it by the charts. The difference of 45′ of longitude, or three minutes of time, appeared to be the error of the chronometer *

* This error does not affect the longitudes previously given in this Journal: because, as I have before noticed, the corrections now obtained, as well as subsequent corrections, have been applied to all the longitudes observed during the voyage.

In the afternoon, within six leagues of Myngeness, we passed through a number of little patches of a dark brown water; different, however, both in tint, and in the form of the patches, from that seen on the 1st. Some of our sailors, who had been employed in the herring fishery, attributed it to herrings or to herring-spawn. A large net (that was constructed for the purpose of collecting marine insects by an obliging female friend), being put overboard, as we passed through one of the brown patches, caught a number of medusæ, a small star fish, and two shrimps. One of the medusæ was a small species, resembling in shape and dimensions, the thimble used for sewing; but with this difference, the tube was compressed instead of being cylindrical. The star fish was gelatinous. It was scarcely the size of a hazel-nut. It had, I believe, eight rays, with a gelatinous sack appended to the radiating point. Besides these animals taken up by the net, there were multitudes of large medusæ, from six to nine inches in diameter, in the water. The chief kind was the M. purpura.

—In the evening, the wind coming to NW b W., and blowing fresh, we tacked to the southward; and, under a pressure of canvas, succeeded in weathering the Faroe Islands.

The tops of the higher cliffs of Kalsoe and

Ostroe, it was remarked, were capped with clouds, which remained in a state of apparently calm repose upon the summits, while a breeze, little short of a gale of wind, carried all other clouds along with great velocity. This is a circumstance so common in these islands, and indeed in all mountainous countries, that it would scarcely have merited observation, had it not formerly suggested to me an explanation of the phenomenon of the suspension of clouds, which, as far as I know, is new *. The force acting against the suspension of clouds, is gravity, which, on account of the resistance that very minute substances, such as the almost invisible particles of vapour in clouds, meet with in their descent, from the air, can be productive of no great velocity; but the force acting against the retention of clouds on the tops of mountains, in boisterous weather, is the wind, which may have a velocity of fifty miles an hour, or upwards. Hence whatever cause is sufficient for the retention of clouds upon mountains, against the action of the wind, must be sufficient (all other circumstances being the same) for the sus-

* The first observation of this circumstance occurred in 1820, while passing the Faroe Islands, in a gale of wind. The theory of the suspension of clouds that was suggested by it, was first communicated to the Liverpool "Society of Travellers into Foreign Countries," about two years ago.

pension of clouds in the air, where the tendency to quit their position is induced by a force perhaps not one-tenth so great as the former. In the case of the retention of clouds upon mountains, it might be objected, that, notwithstanding a gale may be blowing in the lower parts of the atmosphere, the air on the tops of the mountains may be calm. It must be admitted, that the various currents known to exist in the atmosphere, at the same time, in different strata, might justify this supposition, were there no facts that could be brought forward to prove the prevalence of the wind aloft as well as below, in instances where the clouds were retained. These facts, indeed, being so much within every person's observation, who has visited mountainous countries, scarcely require an example. Two instances, however, may be given. On a former voyage, when the highest summit of Ostroe was observed to be covered with a stationary cloud; during a strong gale, the lower atmosphere was full of those scattered clouds called by the sailors "scud," whose flight, in storms, is so striking and rapid. Some of these patches of cloud were evidently at the same level as that of the highest land; because, in a large patch passing across the summit, it was sometimes observed that a portion of it coalesced with the cloud reposing thereon, and

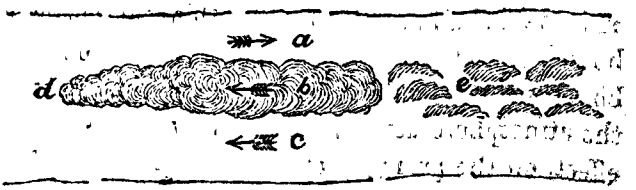
the rest flew away, with undiminished velocity to leeward. The other example that I have to mention, relates to Benlomond. I ascended this mountain on a fine clear day, in the month of October. There were indeed some flying clouds in the air, the wind being high, but these were small and few. The summit of Benlomond, however, was capped with a stationary cloud. This cloud proved to be of the nature of mist, of the densest kind. The particles of vapour were remarkably small, and were flying rapidly past me by the action of the wind. At the very top, indeed, the gale was so strong that I could scarcely keep my feet; yet the cloud steadily maintained its position for several hours. Now, as the cloud could not possibly remain stationary on the mountain, without moving to windward with a velocity equal to that of the gale, a notion which it would be absurd to entertain, its apparent fixedness can only be attributed to progressive deposition of aqueous vapour, or formation, on the one hand, and to equal solution and dispersion on the other. It is, therefore, absolutely certain, that the stationary appearance of the cloud, in this instance, was the effect of condensation produced on the air, as it approached the mountain, and absorption as it receded from it; so that, while the cloud seemed, to a distant observer, to be the same

mass of vapour, neither varying in size nor form, for a quarter of an hour together, it was in reality changing the whole of the particles of which it consisted, perhaps every minute. The cause of this phenomenon is to be looked for either in electricity or temperature. In the case before us, however, the agent is most probably electricity. Thus damp air, otherwise transparent, when it comes in contact with elevated peaks, or rather within the sphere of its electric atmosphere, becomes obscure from the deposition of moisture: this obscurity continues during its passage through the sphere of electrical influence, and then is immediately redissolved, and disappears.

This doctrine, substituting changes of temperature or changes of humidity, for changes in the electrical action, will enable us, I conceive, to explain the phenomenon of the suspension of clouds, without resorting to the unphilosophical opinion of the existence of vesicular vapour lighter than air. We shall suppose two portions of perfectly humid air, of different temperatures, to be combined, no matter by what cause, in that part of the atmosphere usually occupied by clouds. The effect, on the principle of Dr Hutton's ingenious theory of rain, must be a condensation of a portion of moisture in the form of vapour. This vapour, however fine its particles, or whether its particles

be vesicular or not, if it be water, *must* be heavier than air, and will consequently descend. After a certain distance accomplished in its descent, the aqueous vapour perhaps passes into a stratum or patch of comparatively dry air, or air not saturated with moisture, where the attraction of the air for water will necessarily occasion the solution of the vapour, and its disappearance. Thus we can account for the suspension of clouds on principles universally known and admitted. The steady form and position sometimes maintained by the clouds in the open atmosphere, I apprehend to be, as in those on the tops of mountains, rather apparent than real;—the visible suspension being the effect of continual condensations of moisture on the upper, and solutions on the lower parts.

For a further illustration of this opinion, let us suppose three horizontal strata of air, *a*, *b*, *c*, in a



vertical series, at a considerable altitude, and in different states or velocities. Let the two upper

strata a, b, be of unequal temperature, (say $a = 40°$; $b = 50°$) and moving either with different velocities, or in different directions. Their unequal motion would produce an admixture, which, in the case of their being perfectly humid, must occasion condensation. The vapour thus condensed, would descend by the action of gravity, and would continue to present the appearance of a cloud, so long as it was passing through absolutely damp air of uniform temperature; but on falling into a third stratum, c, of dryer air, of a similar temperature, it would be absorbed and disappear. This would mark the lower edge of the cloud. But should the descending vapour, instead of a third stratum of less humid air, meet with a continued stratum, damp to saturation, it must fall to the earth; and if the temperature of the lower air should be higher than that of the vapour, the air would lose some of its heat in raising the temperature of the vapour to a mean, which would cause a deposition of moisture from this stratum also, (because, if it were perfectly humid in its former temperature, it could not contain all its moisture under a less heat), whereby the aqueous particles, being now brought nearer together by their increased numbers, would have a greater tendency to coalesce, until they were enlarged to the magnitude of drops, that should be productive of

showers of rain. It is, therefore, satisfactory to notice, that the explanation now offered, of the cause of the suspension of clouds, is perfectly consistent with our ideas respecting the general cause of rain; and, indeed, that the same principles that are requisite to account for the one phenomena, are equally applicable to the solution of the other. There is no great difficulty in accounting, on this theory, for the limited space occupied by clouds; though it could scarcely be expected to extend to an explanation of the various modifications observed, unless we had correct observations on the hygrometrical and thermometrical states of the atmosphere, where these different modifications occur. Instead of a continuous stratum of cloud being formed by the process above stated, there would be a termination of the cloud, giving a definite edge, whenever the strata *a* and *b* became of the same temperature. Thus, all other things being the same, suppose the stratum *b*, which has been taken at the uniform temperature of 50° to be 40° at the place *d*. This being the same temperature as that of the upper stratum, could be productive of no deposition; consequently the cloud at this point would terminate. And again, let us suppose the strata *b* and *c* to be at rest, and the stratum *a* in motion, and, while the temperature of *a* is uniformly the same, let that of the

upper edge of *b*, be in alternate patches at the temperatures of 40° and 50°, all damp to saturation;—then the cloud produced at *c*, would assume the form of the masses of air that had the highest temperature, and might consist of innumerable streaks or patches, of varying magnitude and density.

But, let it be observed, these remarks do not extend to the denial of the electrical origin of some clouds, nor indeed to the denial of an occasionally electrical agency in the production of rain. For it is highly probable, if not certain, that the thunder-cloud receives its peculiar form and character from its electrical state; and that thunder showers, hail in summer, and the formation of lumps of ice in the atmosphere, are phenomena, in the production of which electricity is an important agent.

The northern face of the Faroe Islands abounds with huge perpendicular cliffs, somewhat columnar, rearing their proud crests over the ocean, to the height of 1500 and 2000 feet; and defying, apparently, the ravages of time, and the rage of the elements. I once approached one of these cliffs under circumstances of extraordinary interest. The weather was thick and stormy: we were anxiously looking out for the land. A shower pass-

ing us, the prospect was a little extended, when, suddenly, a tremendous precipice towering almost over our mast-head, appeared within a quarter of a mile to leeward of us. The sea broke with prodigious force against its base, and in some places threw up columns or jets of water to the height of more than a hundred feet. The partial obscuration of the summit of the cliff, which could just be discovered peeping through the clouds,—the forbidding blackness of the rocks,—the magnitude and elevation of the precipice, which is stated to be 2400 feet perpendicular,—the foaming of the waters,—the raging of the storm,—the universal gloom and obscurity around us,—and the threatening of danger, though rather apparent than real, formed altogether one of the most truly sublime scenes I ever witnessed.

These islands are visited by an extraordinary share of thick and stormy weather. I have seen them repeatedly; but it was almost always under similar circumstances. On passing under their lee in the spring of 1821, the whole range of islands was continually capped with a dense mass of gloomy clouds. These clouds extended to leeward, or to the westward, as far as the eye could reach, and frequently emitted showers of rain and heavy squalls; while both to the northward and southward of the land, the sky was comparatively

clear. This covering of cloud was so thick, consisting of innumerable patches of compact *cumuli*, that the light transmitted through it, gave to the land the effect of a gloomy panorama; while the bright specks of sun-beam that occasionally broke through, and cast a brilliant light on different sublime promontories, cliffs, or elevated peaks, produced a variety and changeableness of appearance, similar to that given by an unequally illuminated phantasmagoria. The effect was at once surprising and beautiful. The squalls experienced, under the elevated cliffs of Faroe, are often exceedingly fierce. They seem to be occasioned by some retarding force on the wind, (whether electrical or not, is difficult to ascertain),exerted by the higher hills, until the obstruction produces such a condensed and accumulated mass of air, that at length overcomes the attractive or retarding force, and bursts upon any leeward objects it may encounter, with a degree of violence that endangers the masts of shipping, and throws the waters into foam.

September 7th.—The sea in the night was luminous, in large globular spots,—probably the effect of a continuation of the numerous large medusæ seen the preceding evening. The wind was on the whole fair, but our progress to the south-

ward was greatly retarded, in consequence of heavy swells from the NW., WSW., and S., prevailing at the same time. Our latitude at noon was 60° 28′, longitude 7° 30′ W.

Several small land-birds and hawks were seen flying about. These were all so wearied with their flight, that they generally alighted on the ship; and several of both kinds were caught alive. The pursuit of the hawks was supposed to be the reason of these little birds leaving the land.

The heavy sea continued all the next day. Though we had a moderate breeze "right aft," we made but little progress, and sometimes the re-action of the head-sea was so equal to the action of the wind, that the head-way of the ship was fairly stopped.

At 6 A. M., of the 9th of September, we made land, which proved to be the Butt of the Lewis, and at 1 P. M. tacked close in with Gallan Head. The weather had a stormy appearance, which was indicated by the character of the clouds, and by the frequent occurrence of rainbows and "weather-galls." In the afternoon, the wind coming at NW. by N., and blowing strong, we attempted to advance on our course to the westward of the Lewis, but the night proving threatening and dark, with rain and strong squalls, high sea and scant wind, I considered it too great a risk to at-

tempt to proceed along a lee-shore under such circumstances. We therefore stood off and on during the night.

About midnight we had thunder and lightning, and very hard squalls, with intervals of moderate weather. The squalls coming on without warning, the jib, which was imprudently set, was split from head to foot.

At day-light, the weather looking somewhat better, we made a stretch to the south-westward, and passed betwixt the Flannen Islands and Gallen Head at 8 A. M. The swell, however, and scant wind setting us rapidly towards the eastern land, we tacked at 11 A. M., and stood off, the sea then breaking terrifically on this "iron-bound shore." We weathered the Flannen Islands in the evening, and passed within a mile of them. Among this group, there is only one that is covered with herbage, as far as I could perceive, and of sufficient importance to be entitled to the name of an island. This is about a quarter of a mile in diameter. Another, nearly of the same size, but apparently quite barren, lies about half a league from it. The rest are mere rocks, rising very little above the surface of the water; but the larger islets, fortunately for the navigator, are so considerably elevated, that they may be seen five or six leagues from a ship's deck. As I did not perceive any broken

water among them, I apprehend there are no sunken rocks lying at a distance; there appeared, indeed, to be a passage for shipping betwixt the two largest islands of the group.

The islands, or skerries, which here and there skirt the forbidding coast on the western side of the Hebrides, appeared to me, from some bearings taken at noon, to lie farther off the main than represented in the charts. This seemed to be particularly the case with *Gashere*, which, according to my observations, is considerably more in the way of the coasting navigator, than he would expect from the appearance of the chart.

Towards midnight we encountered heavy squalls, with rain, which increased to that degree that put us under close-reefed topsails. The night was excessively dark; the only object that could be seen a ship's length from us, was the broken water on the tops of the waves, which was rendered visible by its fiery luminousness. The sea increased until it became tremendously heavy. Two or three seas broke upon deck, and carried away our waist-boards.

Dreading to fall in with St Kilda in the dark, which we were likely to do, because of the wind having shifted to SSE, we wore at 1 A. M., and stood to the eastward; and at 3 A. M., the wind having unfortunately westered, we wore again to

the NNW. The storm raged with great violence the whole of the day (the 11th); notwithstanding which, we were obliged to carry as much canvas as possible, to endeavour to gain an offing from the dangerous coast to the eastward. But the frequent shifting of the wind happened unfavourably for us, and at mid-day we could not calculate upon being above five or six leagues from the land.

In the afternoon the sun broke through the dense atmosphere that had hitherto prevailed and screened its rays; but instead of cheering us with its presence, it only illuminated the edges of the black tempest-threatening clouds, and partial spots of the surface of the turbulent sea, throwing the other portions of the sky and sea into tenfold gloom, and portentous obscurity. The gale for a few minutes rather subsided; but the tempestuous expression of the heavens was too well marked, and the low state of the barometer (28.50) too strongly indicative of a storm, to allow us to hope for a present cessation of the gale. The deceitful *lull* * was only an interval of accumulation; for the wind now chopping round to NW. by N., (a direction "dead" upon the land), its pent up stores suddenly burst upon us with the fury of a hurri-

* Brief interval of moderate weather in a storm.

cane. The yards, sustaining no other canvas but two topsails, reduced to the smallest possible compass by four reefs, quivered under the pressure; and the ship was forced almost on her "beam-ends*." We were not only exposed to the overwhelming violence of this fearful storm (by far the heaviest I ever encountered), and to the action of a mountainous sea, rendered awfully heavy and cross by the sudden changing of the wind; but to all the anxieties attendant on a situation so near a lee-shore.

At first it appeared to me the most practicable measure, to attempt to double the Butt of the Lewis, as there seemed little hope of being able to clear the land, standing to the south-westward. With this view, therefore, after taking in the main-topsail, and employing every other practical means of assisting the ship to wear, we got her head round to the NE.; but, notwithstanding our critical situation, we were unable to spread a stitch of canvas excepting a reefed try-sail, for nearly two hours.

No water had yet been shipped, though the tremendous sea that was running, was received upon the ship's quarter, or beam, being in a di-

* The state of a ship when inclining dangerously to one side.

rection of all others the most dangerous. A fatal wave, however, at length struck the quarter*, with tremendous violence, and throwing up a vast weight of water carried along with it, in its passage across the deck, one of our harpooners, or principal officers (who, along with several others, was employed on the weather-rail endeavouring to secure one of the boats hanging over the side) quite over the heads of his companions, and swept him overboard! Most of the crew being under water at the same time, his loss was not known until he was discovered just passing under the ship's stern, but out of reach, and lying apparently insensible upon the wave. He was only seen for a few seconds, and then disappeared for ever.

For some minutes, it was not known who the sufferer was. Every one was greatly distressed; and each, in his anxious exclamations, revealed his fears for his friend. "It is Shields Jack," cries one. "No," replies a voice of feeling selfcongratulation, "I am here."—"It is Jack O'Neill," exclaims another;—"Aye, poor fellow,—it is Jack O'Neill." But a dripping stupor-struck sailor, clinging by the weather-raill, comes aft at the moment, and replies, "No, I am here." After a pause of

* The side of the ship towards the stern.

suspense, one adds, "It is Chambers."—"Ah! it must be Sam Chambers," cries another; and no voice contradicted the assertion,—for his voice, poor sufferer, was already choked with the waters, and his spirit had fled to meet its GOD! Happily he was an excellent man; and there was no doubt with those who knew his habitual piety, and consistency of conduct, that he was prepared to die. His conduct, in every case, was worthy of his profession; and was a sufficient proof, if such proof could be necessary, that religion, when real, gives confidence and courage to the sailor, rather than destroys his hardihood and bravery. He was always one of the foremost in a post of danger, and met with his death in an exposed situation, to which duty called, where he had voluntarily posted himself.

Melancholy as the loss of a comrade was, the individual and personal danger of all hands, prevented any one from dwelling at that time, upon an event calculated, under other circumstances, to arouse the keenest sympathies of the most thoughtless. Several others of the people had very narrow escapes. Another harpooner, who was in a similar situation with Chambers, and close by him, was washed up into the mizen-rigging; and, on recovering his recollection, found himself instinctively grasping the rope that saved him.

It was now sun-set, and we had the terrible prospect before us of a dark and dismal night, in which we must encounter the several dangers of stormy wind, tremendous sea, neighbouring rocky islands, and a lee-shore.

Hitherto, for nearly two hours, the ship, though rapidly nearing the land, was laid-to under bare poles. This was a matter of prudence as well as necessity; because, had we set any canvas while the hurricane lasted (for such was the character the gale for a time assumed) the loss of the sails, if not of the masts, seemed inevitable. In either case, we must have drifted on shore in a few hours, and nothing could have saved us. Soon after shipping the fatal sea, however, the hurricane character of the gale began to change, and the wind fortunately veered a little more towards the north, so that we found, if we could carry sail, we might, under the blessing of GOD, be able yet to clear the land on the starboard tack. We therefore set a treble-reefed foresail, giving it every support that we could contrive, and wore to the westward. We then added the close-reefed main-topsail, and reefed trysail, which was all the canvas the ship could safely bear. Under this sail, we were urged to the westward, against the sea, which now and then broke over the ship, threatening to sweep every thing away. St Kilda now lying di-

rectly in our way, and being near us, became an object of great alarm. We were apprehensive that, should we fall in with it at night, we should not find room to wear clear of it. Every possible precaution was used. A "hand" was lashed in the fore-rigging to look out: others were stationed wherever they could be secured; and the remainder of the crew were kept in readiness below, to come up at a moment's warning. Providentially, we passed the night,—a dangerous and anxious night, of uncommon darkness,—without falling in with any thing, or experiencing any accident, excepting the washing away of our bulwarks fore and aft,—the staving of one of our boats,—and the loss of another. This damage and loss was sustained by the reflux of water, principally taken over the gunwale and rail to leeward,—knots of seas sometimes bursting from under the ship's lee, and rising to the height of two or three yards above the deck.

Joyful was the appearance of day-break. I never before understood the full force of the expression of the Psalmist,—"My soul waiteth for the Lord, more than they that *watch for the morning*."—When the curtain of night began to be withdrawn, a marked darkness appeared on our lee-bow, which, as day-light advanced, proved to be the object of our apprehension, St Kilda, at the distance only

of three or four miles. The weather now beginning to moderate, we were enabled, with such a good land-mark, to bear away to the southward; and under such improved prospects, that the painful anxiety continued through a night of extraordinary danger, at once gave place to feelings of gratitude, and almost turbulent exhilaration *.

The barometer again proved a faithful monitor. It fell to 28.5, a little before the commencement of the gale, and steadily maintained its level, until the tremendous fury of the evening storm had overtaken us: it then began to rise, and anticipated the amendment of the weather in a regular proportion. At 4 A. M. of the 12th, it

* In this, and several other instances, that placed me in circumstances of danger during this voyage, I have frankly expressed my feelings when my life has been in peril. This is, perhaps, not the usual practice with those engaged in naval affairs, as it might be construed, by illiberal persons, into a deficiency of personal courage; but I make no scruple in asserting, that there is much affectation and insincerity in the words of one, who, in a case of known danger, where the mind has no other occupation than its contemplation, can set lightly by the value of his life. True religion is, doubtless, the only principle that can enable a man, conscious of his situation, and of the importance and reality of a future state, to meet death with calmness and fortitude. If such feelings are otherwise experienced in the deliberate expectation of death, they can only be attributed either to insensibility, or to some other false principle of repose.

was at 29.2, and at noon 29.8, being a rise of 1.3 inches in sixteen hours.

The day so improved, that before evening it became pleasant. We passed within sight of Barra Head before sun-set; and the next day, September 13th, having a slant of wind from the eastward, we fetched the coast of Ireland, near Inistrahull Island. This was the first day of summer weather that we had had. The sky was clear,—the sea smooth, and the wind moderate: the thermometer, however, never rose above 58°. We were busily employed in getting the whale-lines suspended for drying, and then in packing them away in separate coils for future service.

September 14th.—Blowing fresh all day directly against us. The tides, which run strongly in the North Channel, were found to be unfavourable to our progress, the ebb running longer outward than the flood sets in. Our progress, therefore, to windward, under a pressure of canvas all day, was only about fifteen miles.

In the afternoon I took a set of observations, for proving the rate of the chronometer. When compared with the longitude of Inishoen Head, as given by the charts, it appeared to be 2′ 49″ too slow, which was very satisfactory, differing only 11 seconds from the error given by the observations made off Faroe.

The sun exhibited a curious appearance at setting. A little before the lower limb had descended to the horizon, it became suddenly elongated downwards, in the form of a prodigious balloon of fire; and what added to this similarity, was its intersection, horizontally, with two or three streaks of black cloud, resembling belts. This appearance occurred when the sun was directly in a line with Inisterhol, which not only eclipsed the light upon this island, but emblazoned it with the most splendid luminary in our system.

Sunday, 15th of September.—The wind continuing at SE., and blowing fresh with hard squalls, we made but small progress, having only gained about twelve miles in four-and-twenty hours. At 10 A. M. we tacked within two miles of the magnificent basaltic promontory, Bengore Head; but before sun-set we were driven, by the ebb-tide, several miles to leeward.

We had Divine Service as usual. It is a little remarkable, that, during the whole of the voyage, no circumstance ever occurred to prevent us engaging in public worship on the Sabbath day: in a few instances, the hour of worship could not exactly be kept; but opportunity was always found, of having each of the services in succession, on the plan adopted at the commencement of the voyage. It is also worthy of observation, that in

no instance, when on fishing-stations, was our refraining from the ordinary duties of our profession on the Sunday, ever supposed to have been eventually a loss to us; for we, in general, found, that if others, who were less regardful, or had not the same view, of the obligatory nature of the command respecting the Sabbath-day, succeeded in their endeavours to promote the success of the voyage, we seldom failed to procure a decided advantage in the succeeding week *. Independently, indeed, of the Divine Blessing on honouring the Sabbath day, I found, that the restraint put upon the natural inclinations of the men, for pursuing the fishery at all opportunities, acted with some advantage, by proving an extraordinary stimulus to their exertions, when they were next sent out after whales; moreover, when the preceding week happened to have been laboriously occupied, the day of rest thus obtained had a beneficial effect, by restoring the energies of the people, and fitting them for a renewal of their arduous duties.

* Were it not out of place here, I could relate several instances, in which, after our refraining to *fish* on the Sabbath, while others were thus successfully employed, our subsequent labours succeeded under circumstances so striking, that there was not, I believe, a man in the ship, who did not consider it the effect of the Divine Blessing.

The night of Sunday was dark and squally. Under the influence of strong tides, the sets of which are not well described, we navigated the narrows, between Rachlin Island and the dangers on the east side of the Mull of Kinho, in much anxiety. This channel, subject to bad weather, having strong tides in it, and being encumbered with various dangers, is in great need of some additional lights. There are only two (one at Inistrahull and another at Fannat Point), in the whole outlet of the channel from the Mull of Cantyre to the exterior coasts at Barra Head on the north, and Tory Island on the south, comprising in the two lines of coast an extent of 200 miles*. A good light on Rachlin Island would, I conceive, be a great advantage to the navigation, particularly as the tides about it are very strong, and have various sets, which it is difficult to calculate. Such a light would be a great advantage to ships attempting to pass the narrows of the channel at night, and particularly to those endeavouring to beat through it in the dark. Ano-

* There is now a light on the Mull of Cantyre; but being on the fixed principle, it can only be seen at a short distance on one side, and is intercepted by a point of land on the other. It is, however, in a useful position, and will, hereafter, become of more importance, as I understand the light is about to be improved.

ther on the rocks of Skerivore, lying fifteen or sixteen miles to the SW. of Tiree Island, and abounding with dangers, would be a valuable safeguard to vessels making the land from the westward, and entering the channel, or contending with adverse winds within it*.

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* The danger of the Skerivore is of no ordinary nature. Though some of these rocks are above water, and may be seen at the distance of four leagues, in clear weather; yet "there is a rock, dry at half-ebb, near a mile east of it: and another rock lying WSW⅛W from it, about 2½ miles, also drying at half-ebb." This rock is fifteen miles from Tiree, the only conspicuous land; and half way between it and Tiree, "lies Boinshly Rock, which is very dangerous, being seldom uncovered." These rocks, which greatly impede and endanger the navigation of the North Channel, would be much less formidable, were there a good light on the Skerivore. It would be also desirable, that the lights be produced by gas derived from oil, not merely for the encouragement of our fisheries, but because of this light being the most brilliant and effective that could be employed in this way.

It is the intention, I understand, of the Commissioners of the Northern Light-houses, to have a light-house on the Skerivore; but as it is expected to prove an expensive undertaking, it is to be apprehended that it will be some years before it is erected. Another light designed by the Commissioners, is, I am informed, to be placed upon the Runs of Isla. This will, no doubt, be of great use to the navigation; and may, perhaps, answer in place of a light on Rachlin.

The only objection to the multiplication of light-houses, (excepting the expence, towards which there is no one who knows and experiences the value of them, that would not cheerfully contribute), is the possibility of mistaking one light for another. There are several principles, however, now usually employed as a distinction of lights, that are quite effectual when known. A fixed, or uniform light, and a revolving light, are differences so striking that they cannot be mistaken: these are also varied by the use of coloured skreens; and the latter are further defined by a difference in the period of the revolution of the lights. Some other principles might be adopted, I conceive, that would render the lights still more effective. In all elevated lights, for instance, a simple indication of direction and distance might possibly be given, by the use of coloured skreens, to be applied only in such a way as to produce their effect around the limits of any particular danger. Or the same object might, perhaps, be accomplished, by having a secondary light in the same building, that should be so guarded by opaque skreens, that it could only be seen by the navigator on his advance into danger; or what would amount to the same thing, it might be eclipsed in certain positions by an opaque skreen, so as to mark by its disappearance the proximity of danger. And in

those cases, where two light-houses are erected near together, in place of one, for the sake of distinction, the line of their direction might not only be arranged, so as to mark the position of the most dangerous rock or shoal, as is commonly practised; but such a difference might be given to their altitudes, as should point out the distance of such rock or shoal, by the two lights appearing at the same horizontal level in a fair-way for passing these dangers.

Distinct as all neighbouring lights generally are, their peculiarities and descriptions are not sufficiently known to render the differences sufficient to prevent occasional mistakes. There is a defect in this part of the system, indeed, which is in great need of being supplied. Some of the Directions sold with nautical charts, contain an account of many of the lights; but this is often imperfect, and sometimes it is altogether omitted. There is, in fact, no complete description of the lights to be had, though it is well known, that, for the want of such a description, many fatal accidents (arising from the mistake of lights) have been occasioned about the British coasts. To remedy this important defect, I would beg leave to suggest, that the different Light-house Boards of England, Scotland and Ireland, should publish conjunctly, to be renewed occa-

sionally, a complete list of all the light-houses in the United Kingdom *, containing a particular description of each; its bearings, per compass, from neighbouring dangers, headlands, &c.; with such practical remarks as may be useful to the navigator: which list might be put in the way of every sailor, by being stitched up with the Nautical Almanack, Nautical Ephemeris, and all works on navigation in general; and, what would still farther secure its universal circulation, it might be kept at all the custom-houses, and a copy given or sold to all persons paying for lights on their clearing outwards. Such a measure would relieve the mind of the navigator from numerous embarrassments, and would enable him to proceed with confidence and safety amid different lights, where now they are often very perplexing to strangers, to whom their distinguishing characters are not known †.

* Mr Robert Stevenson, civil-engineer, has in hand an Account of the Bell-Rock Light-House, with an introductory description of the Northern Light-houses in general, which will afford all the materials necessary for the proposed descriptive list of the lights belonging to Scotland.

† It was not until within a few years, that any particular list and description of the lights about our coasts became of any consequence, since they were previously so few, and generally so remote from each other, that they could scarcely be mistaken. Now, however, the number has become

In the afternoon of Monday (16th of September) the wind still continuing contrary, we stood close in with Bengore Head, that we might have the advantage of the earliest flood-tide. I now designed to attempt the "Sound of Rachlin," by which we should not only get much farther to windward, than by going to the northward of Rachlin Island, but should have an earlier and a stronger tide. With this view, we stood close up along shore, passing within 200 or 300 yards of Sheep Islands; but when we had nearly reached the *Bull* of Rachlin, the wind headed us, and fell nearly calm. As I did not like to pursue a navigation with which I was unacquainted in the dark, and there was now no possibility of accomplishing it with day-light, I thought it prudent to bear up, and go to the northward of the island. Having passed Rachlin, the wind rather favoured us, in consequence of which, with a strong tide under our lee, we weathered the Mull of Cantyre, at midnight, at the distance of about a mile. In this position, we had reached a different set of the

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so great, that the want of such a descriptive list will be evident, when I mention, that the number of lights on the eastern coast of Ireland only, is thirteen or more, and on the opposite coast of Britain above twenty, of which number, at least thirty might occasionally be seen from a vessel passing quite through the Irish Channel.

tide; so that, had the breeze continued, we should have been benefited by the ensuing ebb coming out of the Firth of Clyde, and Loch Fine; but the wind unfortunately died away, and it fell stark calm. The ebb now beginning to run, first swept us to the westward, clear of the Mull of Cantyre, and then towards the WNW., with an alarming velocity. In fifteen or twenty minutes, the bearing of the Mull Light changed from N b E., to E b N. Being now completely at the mercy of the tide, and in deep water, we could only sound occasionally, and have all in readiness for bringing up, if we seemed to be falling into danger; but the extreme darkness of the night, and fierceness of the tide, defied all ordinary precautions. At this very anxious and critical period, a loud roaring was heard towards the north, which was at first mistaken for breakers on the shore. It was the effect, however, of a fresh of wind that fortunately sprung up from the northward. The ship's head being turned to the SSE., we attempted to sail up channel; but such was the rapidity of the tide, that, for four or five hours, when making five and a-half or six knots way through the water, we did not alter the bearing of the Mull light on the beam, above half a point, and probably did not gain a furlong of ground

At day-light the tide began to slack, and we

soon afterwards got clear of this dangerous and perplexing strait.

Pursuing our course up the channel, we got sight of the Isle of Man, in the afternoon, and at 8 P. M., passed the Calf. On this rock or island (the Calf of Man) there are two excellent lights on the revolving principle, erected by Mr Robert Stevenson, that are remarkably well situated. These lights, when they appear in a line, mark the direction of a small rock, called the Chicken, which is the only danger in the way.

As we had now a brisk breeze, in a favourable direction, there was a probability of our reaching our port in the course of the ensuing day. On this near approach to home, after an absence of almost six months, without receiving from our friends the least token of their welfare, and without the possibility, even of being reached by the excursive breath of rumour, there is an anxiety, respecting the fate of our nearest and dearest connections, in whose welfare our temporal happiness, in a considerable degree depends, which is of the most intense and awful description. This anxiety with myself, on this occasion, was such, as almost totally to suppress those joyous anticipations, which, on their approach to home, after a long absence, I find many persons around me, unreservedly indulging. In the ordinary separation

of friends, their approach and reunion is generally intimated, and the most momentous events that may have taken place during their separation made known, by letter, or other means of communication;—but in our case, no such harbingers of joy or sorrow can be dispatched, so that if loss and distress, and domestic affliction, be the portion of the returning mariner, the intelligence reaching him, without the softening action of distance, of preparation, or of rumour, comes with awful suddenness and violence. Hence, it is a matter of prudence, as well as of Christian preparation and resignation, to keep the expectations low, by which, blessings, if in store, become enhanced; and trials, if such be ordered by Unerring Wisdom, are disarmed, in some degree, of their overwhelming severity *.

Wednesday, 18th September.—The wind declined and scanted during the night, so that we could not fetch our port; but succeeded in reach-

* The striking applicableness of these reflections to the circumstances that personally concerned me, in the loss, during my absence, of a beloved wife, Whose affection was unbounded, and whose chief enjoyment was to promote my happiness, might seem to be an interpolation. But I conceive it right to mention, that this was not the case; these reflections being taken entirely, and very nearly verbatim from my Journal.

ing Great Orme's Head, at 10 A. M., within four miles of which we tacked. The weather being hazy, we found a difficulty in finding a pilot-boat; but at 1 P. M., we fortunately got sight of one, from which we received a pilot, who relieved me from further anxiety respecting the charge of the ship.

Here my original Journal closes. The melancholy and distressing intelligence that awaited my arrival at home, prevented its being concluded. Memory, however, requires no artificial aid to enable it to recall those circumstances, which the power of agonizing feelings has indelibly stamped upon the heart; but on the contrary, in a case like this, it foregoes its natural frailty, and, as a great poet observes, becomes immortal.

The pilot who was received on board off the Orme's Head, from real or well-feigned ignorance, gave no satisfactory answer to my anxious enquiries respecting my family and friends. We were unable to reach our port on the day of his arrival. I had, therefore, to endure another night of suspense, which was productive of feelings of anxiety, so painful as entirely to subdue the

pleasurable sensations, natural to the expectation of reaching home, after a long and dangerous voyage. Next morning, aided by a strong flood-tide, we entered the channel; but before we could round the "Black Rock," to get into the Mersey, the tide failed us, and we were obliged to bring up.

Numbers of boats and steam-vessels were passing and re-passing, while we lay at anchor. Some of the former boarded us. They contained the friends of different individuals on board. I was in constant expectation of some person coming to inquire for one or other of our late officers and companions, whose death, during the voyage, we had to lament; and had the painful prospect of communicating the distressing tidings to such inquirers, who must now look in vain for their friends. These feelings, however, were eventually absorbed, in the heart-rending intelligence in store for myself.

Notwithstanding the number of boats that came alongside, no information whatever respecting the welfare of my nearest connections, the subject now paramount in my mind, could be obtained. This surprising ignorance, of so many persons, on a subject to which I was so much alive, increased my anxiety; but on marking the countenances and conduct of the boatmen, there was

so much of the appearance of unmeaning indifference, or ordinary cheerfulness, that no indication of concealment could be traced or suspected.

At length, while pacing the deck with an intensity of anxiety, the bare remembrance of which, at the present moment, throws my whole frame into a tremor, I perceived a boat with passengers approaching. As it rapidly advanced before wind and tide, I took the glass, and descried the face of a friend. The first emotion in my mind, at this recognition, was that of hope.—"He is a good man, and cometh with good tidings!" But on a second inspection of the boat, some peculiarities in the conduct of the passengers checked the transitory joy which this frail hope had created. The sail was taken down, and the men lay upon their oars, while the boat approached only under the influence of the tide. The kind consideration of my friends, had, on former occasions, when they came to welcome my arrival, always relieved my suspence, while yet at a distance, by some token of good news. Now, however, panting with agitation, I watched in vain for some encouraging action or word. I supposed they had not seen me. I showed myself at the gangway, but their averted faces, and downcast looks, too strongly indicated that they were the harbingers of sorrow. I could no longer sustain an agony of feeling,

which silence and uncertainty rendered intolerable. I called out, "Is all well?"—A languid look, and an evasive reply, confirmed my apprehension, and sank me in despair. I could no longer support myself on the deck. I rushed into my cabin. In a few minutes my friend was in my presence. I saw him struggling with himself, and about to endeavour, by a well meant circumlocution, to break the dreadful tidings he had to communicate. "Let me know," cried I, "the worst,—tell it me at once." He grasped my hand with the fervour of friendship, while the tear of sympathy gushed from his eyes.—"I am sorry,"—(my agony obliged him to speak out), "Mrs S——— is no more."

Some of those who glance over these pages, may have been the "sons and daughters of affliction." They may know what it is to suffer. Such will not withhold the sympathetic sigh from one, who, having begun this narrative, in the hope of obtaining some alleviation from the poignancy of sorrow, finds its concluding pages blotted with his tears.

APPENDIX.

APPENDIX.

No. I.

LIST of SPECIMENS of the ROCKS brought from the Eastern Coast of Greenland, with Geognostical Memoranda. By Professor JAMESON.

I. Specimens found on Icebergs near Cape Brewster.

1. Transition clay-slate.
2. Slaty talcose granite.
3. Granular felspar.
4. Hornblendic mica-slate.
5. Gneiss.
6. Basaltic greenstone.

Remarks.—The specimens above enumerated, independent of those collected on the coast, would have afforded proofs of the existence in this country of Primitive, Transition, and Secondary rocks; the talcose granite, gneiss, hornblendic mica-slate, and granular felspar, being primitive; the clay-slate, transition; and the greenstone, secondary. So that thus a few stray specimens on an iceberg, would have enabled the mineralogist, who had no opportunity of landing, to correct and confirm, to a certain extent,

the inferences as to the composition of the country, drawn from the shape and grouping of the mountains, and the forms of the cliffs as seen in the distance.

II. Specimens from Cape Lister, and along the Coast to Cape Swainson.

1. Black mica.
2. Mica-slate, inclining to gneiss, and in some specimens mixed with hornblende.
3. Quartz, common variety.
4. Common calcedony.
5. Red gneiss.
6. Grey gneiss, like that of Huntly in Aberdeenshire, and Freyberg in Saxony.
7. Coarse granular hornblendic gneiss.
8. Gneiss passing into granite.
9. Syenite, in which the felspar is deep flesh-red, and containing disseminated epidote.
10. Hornblende-slate, with intermixed quartz and felspar.
11. Coarse red granular syenite of Werner.
12. Red granite, in which the mica is disposed in six-sided tables and prisms.
13. Secondary greenstone, probably from a vein or overlying mass; the calcedony evidently from the greenstone.

Remarks.—The rocks of this set of specimens, with exception of the greenstone, belong to the primitive class, and are varieties of those original rocks that probably form the most extensive tracts in Greenland. The red Granite may have belonged to some central imbedded mass of that rock, or it may have been broken from a bed in the gneiss, or from a vein traversing the strata of that rock; but whatever its situation was, it is evidently a true granite.

The Syenite, I suppose, formed a bed in the gneiss. From the number of specimens of Gneiss, and other circumstances, it appears that it was the predominating rock on this coast, and that the mica-slate, syenite, and hornblende-slate, were subordinate to it. The red gneiss is that often met with near granite, and in districts abounding in red granite, while the grey gneiss occurs abundantly without granite, or in such districts as contain grey granite.

The greenstone, from its association with calcedony, appears to be secondary, and may have been derived from a vein, resembling those so frequently met with in Scotland traversing our primitive rocks.

III. Specimens from Neill's Cliffs and Cape Stewart in Jameson's Land.

1. Sandstone composed of quartz, felspar, flinty slate, and silver-white mica.
2. Same sandstone, with imbedded crystals of red felspar.
3. Slaty sandstone.
4. Sandstone impregnated with red iron-ore.
5. Common grey sandstone.
6. Common sandstone, stained yellow.
7. Common sandstone, but of coarse grains.
8. Sandstone with pebbles, the size of a bean, of common quartz.
9. Coarse granular common grey sandstone.
10. Common grey sandstone, shewing well its constituent parts, which are grey disintegrated felspar, grey quartz, and silver-white mica. This specimen contains intermixed portions of common black bituminous slate-coal.
11. Sandstone partly conglomerated.
12. Slaty common grey sandstone.

13. Sandstone flag.
14. Common sandstone, weathered.
15. Calcareous sandstone.
16. Coarse variety of common *slate-coal.*
17. Bituminous shale.
18. Slate-clay inclining to bituminous shale.
19. Slate-clay with disseminated mica.
20. Clay-ironstone.
21. Grey, coarse spintery limestone, with imbedded portions of grey quartz and red felspar.
22. Limestone, with imbedded fragments of bivalve shells.
23. Arenaceous limestone, with scales of silver-white mica.
24. Coarse grey limestone, with imbedded scales of mica.
25. Arenaceous limestone passing into calcareous sandstone.
26. Limestone passing into calcareous sandstone; the imbedded minerals, quartz, mica, and felspar.
27. Limestone, with imperfectly preserved pectinites.
28. Greenstone.
29. Greenstone, with minute plates of diallage or hypersthene.

Remarks.—The grey, often micaceous sandstone, slate-clay, bituminous shale, clay-ironstone, grey splintery limestone, and *slate-coal*, characterise this interesting series of rocks as belonging to a Coal Formation. On comparing the individual characters and general relations of these rocks, there can be little doubt of their belonging to that coal formation, in which all our principal British coal-mines are situated, namely, the *Great Coal Formation*, which lies upon old red sandstone and mountain limestone, and is covered in the regular series by magnesian limestone and new red sandstone. A few specimens of red gneiss and red granite were picked up on the beach; but these appear to have been accidental.

IV. Specimens from Traill Island.

Trap Rocks.

1. Greenstone.
2. Decomposed felspathose greenstone, with disseminated iron-pyrites.
3. Compact felspar, inclining to claystone.
4. Compact felspar, tinged green, with augite or hornblende.
5. Grey compact sandstone, with disseminated iron-pyrites.
6. *Quartzy sandstone.*

* *Porphyry rocks.*

7. *Rock crystal.*
8. *State-clay, inclining to bituminous shale.* Some varieties incline to slaty compact felspar, as is shewn by the white crust.
9. Compact slate-clay, with waved structure.
10. Slate-clay, with concentric lamellar structure.
11. Calcareous slate-clay.
12. Porphyry.
13. Porphyry, highly crystallised.
14. Porphyry, with cubic iron-pyrites.
15. Porphyry, with abundant cubic iron-pyrites. The mass principally compact felspar.
16. Weathered porphyry,—the reddish crust owing to decomposing iron-pyrites.
17. Vesicular porphyry, with imbedded quartz crystals and iron-pyrites.
18. Claystone porphyry, with imbedded crystals of quartz and felspar.

Remarks.—The form of this island, as represented in the drawing, is so different from that of Jameson's Land, and the coast about Cape Lister, &c. as to lead to the conclusion that its geognostical composition must be different, and consequently containing neither the coal formation in its most frequent form, nor primitive rocks. This inference is justified by an appeal to the rocks in this list, which are of the Secondary Trap and Porphyry formations. The secondary trap-rocks above enumerated are greenstone, compact felspar, more or less tinged with augite or hornblende. No basalt, nor tuffa, nor amygdaloid, were met with. The porphyry rocks are the usual varieties with basis of claystone or felspar, and these, like the greenstone, contained disseminated iron-pyrites. These two sets of rocks were arranged together, but in what order could not be determined, from want of time. The slate-clay, and slate-clay inclining to bituminous shale, and sandstone, like the traps and porphyries, also contain iron-pyrites. The whole may be a portion of the coal formation, in which, as on the coast of Fifeshire, and other parts of Scotland, the trap-rocks are predominant, while the sandstone, slate-clay, bituminous-shale, &c. are so inconsiderable in quantity, as to be very subordinate to them, and to contribute very little to the general features of the physiognomy of the country. Or it may be that these trap and porphyry rocks are connected with some of the newer sandstones. The fact of the whole of the members of this series of rocks, viz. the greenstone, porphyry, slate, and sandstone being impregnated with the same iron-pyrites, would seem to point out a similar mode of formation to the whole,—a conjecture in opposition to that opinion

which maintains the volcanic origin of such greenstone and porphyry rocks.

V. Specimens from Cape Brewster.

1. Greenstone.
2. Greenstone,—secondary.
3. Decayed greenstone.
4. Botryoidal calcedony.
5. Common calcedony, inclining to splintery quartz.
6. Calcedony and grey amethyst.
7. Crystallised white amethyst and calcedony.
8. Calcedony and green earth.
9. Composed of calcedony, cacholong, and fibrous zeolite.
10. White amethyst.
11. Amygdaloid.
12. Coarse brown coal.
13. A specimen of agate, composed of calcedony and cacholong.

Remarks.—This headland, from the specimens collected, appears to be composed of rocks of the secondary trap series, and to have the same general and particular characters as that formation exhibits in this country in the Islands of Mull, Canna, Skye, &c. The brown coal would seem to shew, that the trap-rocks here are probably associated with a new limestone or sandstone formation, and not with the old coal formation, such as that of Jameson's Land, which does not contain true brown coal.

VI. Loose Specimens.

Loose Specimens,—locality not known.

1. Mixture of talc and mica.
2. *Primitive clay-slate.*

3. Red Granite.
4. Red Gneiss.

Remarks.—These specimens are also from the tracts surveyed by Captain Scoresby, but the locality unfortunately was lost. The most interesting specimen of the set is No. 2., which is a well marked clay-slate, of that variety which we in this country sometimes find in beds in mica-slate, or in stratified masses resting upon it. This specimen completes the series of the principal primitive rocks, and shews that, in West Greenland, as in all other great tracts of country, the Granite, Gneiss, Mica-slate, and Clay-slate, make their appearance together.

General Remarks.

1. *Primitive Rocks.*

From Captain Scoresby's drawings of the east coast of West Greenland, it would appear that a great portion of it, and also of the mountains in the interior, as of the colossal "Werner Mountains," are formed of primitive rocks. Further, judging from the rock specimens brought home, and already enumerated, and considering the general nature of the country on the west side, as described by Sir Charles Giesecké, the intelligent and intrepid explorer of that desolate region, it would seem that all the principal and subordinate rocks of that class, from granite down to clay-slate, enter into its composition. These rocks exhibit, in this remote region, the same varieties of structure as those on the west coast of Greenland, and these again do not differ from the primitive rocks of Britain, and other countries; thus affording another proof of the uniformity of

character, similarity of position, and universality of distribution of the primitive rocks, in all parts of the world. Judging from what is known of the imbedded minerals on the west coast of East Greenland, and reflecting on the agreement of the rocks, both on the east and west sides of the country, we may infer, that if Captain Scoresby had had leisure for minute investigation, his scientific zeal would have been rewarded by the discovery of the hitherto rare cryolite, the sodalite and allanite, with magnificent tourmalines and garnets,—interesting varieties of zircon,—splendid specimens of hyperstene, the remarkable dichroit, and with all the species of the felspar genus. There does not appear any reason why the ores of iron, lead, tin, and copper, of the West coast, should not occur in the same rocks upon the East; and the fine displays of apatite, calcareous-spar, fluor-spar, and of other simple minerals, on the West coast, which have been the source of so much instruction and delightful contemplation to the scientific inquirer, may, in some future voyage, present themselves, in the newly discovered countries, to the eye and intelligence of the naturalist.

2. *Transition Rocks.*

The specimens of Transition rocks, although few in number, are highly interesting, as proving the existence of that class in Greenland, and thus adding a new feature to its geognosy, for Giesecké does not enumerate any of the slates he met with, as members of the transition series. This fact is also a further proof of the wide distribution of these rocks; and shews, in opposition to certain speculative views, that they are not confined to a few narrow corners of the globe, but, like gneiss, mica-slate, &c. may be consi-

dered as occurring in most extensive tracts of country, and that, therefore, the series is to be associated with the universal formations. We do not know of any example of transition rocks having been met with in so high a latitude.

3. *Secondary Rocks.*

The secondary rocks, as appears from the preceding enumeration, seem to be distributed into at least two formations, viz. the *Coal Formation*, and the *Secondary Trap and Porphyry Formation.*

1. *Coal Formation.*—Giesecké does not mention the coal formation, and therefore it is now for the first time enumerated amongst the rock formations of Greenland. It exhibits the same characters in Greenland as in Europe, and other quarters of the globe, and its prevalence in Jameson's Land is that which gives this great tract of country its peculiar characters, (*vide* page 191.), thus affording another example of the connection of the general and particular forms of the surface of a country, with its geognostical structure and composition. From this series of rocks always containing numerous remains, more or less mineralised, of plants, many of which have a tropical aspect, its occurrence in this high northern latitude, in this region of snow and ice, becomes particularly interesting. The coal formation in Melville Island, where the summer lasts but a few weeks, I found, on examining a series of specimens, to contain various tropical looking fossil plants, resembling those met with in the coal-fields in this country; and, as the same formation occurs in the high latitude of Jameson's Land, it is very probable that future naturalists will detect in its strata fossil remains of plants of a similar nature

Remains of plants with tropical characters, in their native place of growth, under the 70th degree of North latitude, is a fact which leads to very extensive and remarkably curious discussions, in regard to the former state of the climate of the northern regions of the globe, but which cannot be considered here.

From the apparent great extent of the coal formation in Jameson's Land, it is highly probable that it abounds in beds of coal, and if this shall prove to be the case, it may, at some period, become useful to man.

In Greenland, as in Scotland, the coal-formation is traversed by veins (dikes) of greenstone,—another fact, illustrative of the similarity of this formation in both countries.

2. *Secondary Trap and Porphyry Formation.*—The occurrence of secondary trap and porphyry rocks, at Cape Brewster and Traill Island, affords an important contribution to their geographical distribution; and those who advocate the volcanic theory of their formation, will adduce the facts brought to light by Captain Scoresby's investigations, as proofs of the former operations of volcanoes in Greenland. The hot-springs in the Island of Ouanastok, in Lat. 60°, on the west coast, mentioned by Giesecké, and the report of *Zenetti*, of the former existence of volcanoes in a state of activity in Greenland, will, by volcanists, be considered as favourable to the volcanic origin of the rocks just mentioned.

No. II.

LIST OF PLANTS, from the East Coast of Greenland, with some remarks, by Dr HOOKER, Professor of Botany, Glasgow.

1. *Veronica alpina.*
2. *Eriophorum vaginatum?* (a very imperfect specimen; or it may be, and probably is, the same as the following).
3. *Eriophorum capitatum.*
4. *Festuca vivipara.*
5. *Alopecurus alpinus.*
6. *Aira spicata,* Linnæus and Wahlenberg.
7. *Juncus arcuatus* of Wahlenberg, (*Luzula arcuata* of Hooker in the *Flora Londinensis*), which Mr Greville, Mr Arnott and myself found, last autumn, on the summit of the Grampian Mountains; where it had, indeed, been previously detected by Mr G. Don, but never before been published as British.
8. *Oxyria reniformis,* Hook. *Fl. Scot.* (*Rhcum digynum,* Wahlenberg, *Flora Lapponica; Rumex digynus,* Linn.)
9. *Epilobium latifolium.*
10. *Polygonum viviparum.*
11. *Polygonum viviparum,* (another specimen, less viviparous than the above).
12. *Andromeda tetragona,* (beautiful specimens).
13. *Vaccinium pubescens, Flora Danica.* This precisely

accords with my specimens of the plant, received from Dr Hornemann; but I do not consider it different from a dwarf state of *V. uliginosum*, and even Hornemann suspects it may be the same. Neither in the specimens of that botanist, nor in those of Mr Scoresby, can I see the pubescence, described as existing on the leaves.

14. *Saxifraga nivalis.*
15. *Saxifraga cernua*, two specimens; (it is a very variable species).
16. *Saxifraga cæspitosa, var. grœnlandica* of Wahlenberg and Hooker's *Flora Scotica.*
17. *Saxifraga oppositifolia.*
18. *Saxifraga* ———; a very imperfect specimen.
19. *Silene acaulis.*
20. *Stellaria nitida (nova spec.)*, caule inferne pubescente, foliis lanceolatis nitidis siccitate subtrinervibus marginibus basi ciliatis, floribus subpaniculatis, petalis bipartitis calyce longioribus.

Caules 3–4 pollicares, erecti, ramosi, tetragoni, basi subpurpurascentes atque pubescentes, superne glaberrimi, virides. *Folia* remotiuscula, erectiuscula, opposita atque basi connata, lanceolata, nitida, acuta, subrigida, siccitate obscure trinervia, margine inferne ciliata. *Florcs* terminales, majusculi, rarius solitarii, plerumque paniculati; *Pedicelli* glabri, quorum unus elongatus, reliqui magis minusve breviores, ad basin bracteis duobus ovatis, concavis, acutis, viridibus vel purpurascentibus, membranaceis, marginibus diaphanis suffulti. *Calyx* pentaphyllus, foliolis ovatis, obtusis, viridibus, univel obscure tri-nervibus, margine lato diaphano, albo, sub lente ciliato. *Petala* calyce longiora, alba,

bipartita, segmentis ovato-lanceolatis, obtusis, venosis. *Stamina* decem, inæqualia, petalis multo breviora, basi glandula annulari unita. *Filamenta* subulata, alba; *Antheræ* flavæ, ovatæ. *Germen* ovatum, viride. *Styli* tres, erecti, apicibus paululum incurvatis. *Capsulam* maturam non vidi.

In no author have I been able to find any species of *Stellaria* corresponding with the present, my acquaintance with which originated in specimens communicated to me by the late Dr Wright of Edinburgh, and gathered by his nephew, Dr William Wright, in Greenland; but in what particular part of that interesting country, I have no means of ascertaining. Nothing similar to it exists in the many species of Greenland plants which have been sent to me by my friend Professor Hornemann of Copenhagen, and which were collected by Wormskiold; nor is there any thing like it among the numerous plants of that country figured in the *Flora Danica*. With the *Stellaria grœnlandica* of that work, it has nothing but a generic resemblance. The leaves of that individual are quite different in form, texture, &c. and the petals are much larger, and only bifid at the extremity. In general habit it comes near to our *Stellariæ glauca*, *graminea*, and *Holostea*; but its small size, glossy rigid leaves, ciliated margins, broad and deeply divided petals (not to mention other characters), will keep it abundantly distinct.

I purpose soon to figure this species in the *Flora Exotica*.

21. *Cerastium latifolium.* Exactly such as I have intended to define under that name in *Flora Scotica*, and different from *C. alpinum.*
22. *Cerastium* ———; the specimen wants flower, but I think it is *C. alpinum.*
23. *Potentilla verna.*
24. *Dryas octopetala*, undoubtedly, with deep crenatures at the margins of the leaves. The specimens of *Dryas* which I have formerly received from Greenland, have been the *Dryas integrifolia.*
25. *Papaver nudicaule.*
26. *Poa laxa*, Willdenow, Wahl. and of *Flora Scotica*, (*Poa flexuosa*, *Eng. Botany*).
27. *Ranunculus nivalis*, (very fine).
28. *Pedicularis hirsuta.* A Lapland plant, but which has not, that I am aware, been found before in Greenland.
29. *Draba hirta.*
30. *Cochlearia anglica.*
31. *Cochlearia anglica?* perhaps *C. grœnlandica*, but there is no fruit nor flower on the specimen.
32. *Arabis alpina.*
33. *Gnaphalium alpinum.*
34. *Arnica angustifolia*, Vahl, and *Fl. Dan.* v. 9. t. 1524. Unquestionably distinct from *Arnica montana*, of which Linnæus and Wahlenberg have made it their *var. β.*
35. *Erigeron uniflorum.* This species differs from our British *E. uniflorum*, in the extremely woolly and purple involucre, and is doubtless the species intended by Wahlenberg. But I am still uncertain

if its characters are sufficient to separate it, as a species from *E. alpinum.*

36. *Carex.*—This is in too early a state for me to speak with certainty as to its species; but I apprehend it to be *C. saxatilis* of Linnæus and Wahl. *Fl. Lapponiça.* This, again, is hardly different from *C. rigida* of *English Botany*, which I have, in *Flora Scotica*, reduced to a *var.* of *C. cæspitosa.*

37. *Salix* ——— two plants. No doubt the male and female of the same species of *Salix;* but, although they do not accord accurately with any specimens or descriptions to which I have access, yet, without more numerous individuals, and in different stages of growth from Greenland, than are here present, I should not dare to constitute them a new species. They belong to the division of Wahlenberg, "Germinibus sessilibus," and to the subdivision "Germinibus villosis;" and the species to which they come the nearest in the *Flora* of that author, are the *S. glauca* and *S. limosa* *. They differ from both in the form and villosity of the leaves, and from the former still more decidedly, in the long style which supports the stigma. The following description may be worth noting: "*Frutex* parva, cortice pallide fusca, nitida. *Folia* obovata, vel elliptica, non raro rotundata, utrinque pilosiuscula, juniora valde pilosa, sericea; supra viridia, inferne pallidiora subglaucescentia, minime tomentosa (ut in *S. limosa*). AMENTA *mascula* elliptica. *Squamæ* rotundatæ, subemarginatæ, fuscæ, pilosæ, pilis longis, sparsis, sericeis. *Stamina*

* S. arenaria, *Smith.*

duo. AMENTA *fœminea* ovato-cylindracea. *Squamæ* ut in mare, sed magis nigrescentes rigidioresque, piloso-sericeæ. *Germina* oblongo-lanceolata, pulcherrime sericea, squamis paululum longiora. *Stylus* germine dimidio brevior. *Stigma* bifidum, divaricatum, segmentis bifidis. *Capsulæ* tres-quatuor lineas longæ."

The female catkins, I may observe, have a beautiful appearance, from the contrast between their almost black scales, and the pure silky whiteness of their germens.

38. *Salix* ———: The same *Salix* as the last, but in a more advanced state.
39. *Empetrum nigrum.*
40. *Rhodiola rosea, masc. et fœm.*
41. *Stereocaulon paschale.*
42. *Cetraria nivalis.*
43. *Fucus aculeatus.*
44. *Bryum* ———*?* no fructification, but probably barren shoots of *B. carneum.*
45. *Trichostomum lanuginosum.*

Note.—Some notices respecting the Localities of these plants will be found at pages 188. 215. & 222.

No. III.

LIST OF ANIMALS met with on the Eastern Coast of West Greenland, with Notes and Memoranda *

I. MAMMALIA.

TRICHECUS Rosmarus:—*Walrus, Morse,* or *Sea-horse* of the whale-fishers.

Numerous remains of this animal were found on the shore, among the deserted huts of the natives. But no living specimen was found, along the coast, during this voyage; though I have seen it on a former occasion.

PHOCA Vitulina:—*Common Seal.*

A few of this species of seal was seen, during our stay upon the coast; but they were in general remarkably scarce near the shore.

PHOCA Hispida?—*The Rough Seal.*

An occasional individual, supposed to be of this species, was met with; but none of them were killed on this voyage.

MUS Grœnlandicus:—*Greenland Mouse.*

Two or three specimens of this animal, which appears to be a new species, were found by my father's sailors on Jameson's Land.

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* For the Notes and Memoranda on the *Insecta*, I have been indebted to Professor Jameson; and for the Description of the *Mus Grœnlandica* principally to Dr Traill.

This animal does not answer the description of any of the genus in our systematic authors *. In some respects it approaches to *Mus Hudsonius*, and by some might be considered as a mere variety of that species. The difference of colour, however, the want of the dorsal stripe, and (though the specimen preserved for examination seemed to be a male) the absence of the remarkable peculiarity of the double claws on the fore-feet, seemed sufficient distinctions to mark this animal, as a species hitherto unnoticed by naturalists.

It evidently belongs to Cuvier's subdivision *Lemming*, or mouse with very short ears and tail, and fore-feet formed for burrowing. It may therefore be named either *Greenland Mouse;* or, if we adopt the subdivisions of the French naturalist, *Greenland Lemming.*

Mus Grœnlandicus.

Char. Specific.

Mus brachyurus; auriculis nullis externis, palmis tetradactylis; corpore supra cano, fusco distincto, subtus rufescente.

Short-tailed mouse; without external ears, with four claws on the fore feet; back grey, mottled with dark brown; lower parts rufescent.

Description.—The skin of this little animal measures, from the nose to the tip of the tail, 5.5 inches. It is covered with a thick and beautifully soft fur, the hairs of which are, toward the roots, of a deep blackish-grey, and toward the tips are varied in colour on the different parts,

* Linnæus, Pallas, Shaw, Cuvier.

as will be seen in the sequel of the description. The head is rather small; the muzzle pointed, being suddenly compressed from the anterior angle of the cheek-bones. The front-teeth of both jaws would appear to be *exerted* during the life of the animal. The vibrissæ are numerous, strong, and measure upwards of one inch in length. Some of them are deep brown, others white. Some long hairs also spring from each supercilium. The eyes are large, and are not more than 0.5 inches asunder.

An ill defined greyish-black streak runs from the point of the nose to the nape. The sides of the head are of a more unmixed grey than the rest of the fur. There are no visible external ears; but the situation of the apertures leading to the organ of hearing, is marked by minute tufts of rufescent hairs.

The whole upper part of the body is elegantly mottled with a mixture of ash-grey, of blackish and reddish brown. The whole lower parts are rufescent; and this hue not only extends to the throat and chin, but also to the sides of the upper jaw. The boundary between the colours of the upper and under parts is distinguished by an undulating line of a deeper brown, which passes along the sides of the face, neck and trunk, and is darkest about the fore legs. The tail is very short. Its vertebræ do do not extend more than 0.5 inch from the rump, but a pencil of very stiff white hairs, reaching about $\frac{1}{2}$ inch beyond the last vertebra, forms almost the whole caudal appendage which appears without the fur of the animal.

The legs are extremely short, and, from their strength and position, seem well adapted for burrowing. All the feet are well covered with long white hairs, which extend, especially on the hind-feet, even beyond the extremities of the claws.

The fore extremity has some resemblance to that of the mole. It is furnished with four sharp claws, of which the two middle are much longer and stronger than the rest, and are much hooked. The second claw is considerably the largest. There is no appearance of that induration of the skin below the claws of this foot, which has been described as a double claw, and as peculiar to the male of the Hudson's Bay mouse. The length of the fore extremity measured, along the curvature of the foot and claws, does not exceed 1.1 inch, and is not quite 0.8 in a straight line. The longest claw = 0.4 inch. The palms are hairy. The posterior extremity is rather longer than the other. The foot from the heel to the end of the claws = 0.8 inch. It has four claws, of which the three middle are nearly of equal length,—but they are much less than those of the fore feet. The soles of the feet are thickly covered with a white fur, and the hair on the outside of the foot and leg descends below the heel.

Memorandum by Professor JAMESON.

Hitherto no native species of the mouse tribe have been met with in Greenland, for neither Müller nor Giesecké mention any native animals of this description. It is true the black rat and the common mouse are enumerated in the Fauna Grœlandica, but both these are foreigners imported by the shipping. Had Captain Scoresby found the brown or black rat, or common mouse on the West Coast of Greenland, it would have gone far to settle the disputed point in regard to the ancient European settlements in that country. The species here described by Dr Traill, from its near affinity to the *M. Hudsonius*, belongs to the Lemming group, and probably is for West Greenland what the common Lemming is for Europe;

the *Mus torquatus* for Asia; and the *Mus Hudsonius* for North America.

URSUS Maritimus:—*Polar Bear.*

The white bear sometimes occurs in considerable numbers on the ice, near the coast of Greenland. Great quantities of the bones of this animal were found among the deserted huts on shore, but no living specimens.

LEPUS Glacialis:—*White Hare.*

A small animal of this kind was shot by myself at Cape Hope; and several others were seen here and at C. Brewster.

CANIS —— :—*Dog.*

Several skulls, and other bones of dogs, were found on shore. One of them was taken out of a small grave, supposed to be that of a child.

BALÆNA Mysticetus:—*The common Black Whale,* or *Greenland Whale.*

A great number of this valuable species were seen near the coast about the middle of August, in the opening of Davy's Sound. Prior to this time they were only seen at a considerable distance from the land; but in some places, particularly in the parallel of 72°, they occurred in considerable numbers.

B. Gibbar (La Cepede)—*B. Physalis* of Linné, or *Razor-Back* of the whalers.

Several of these animals, whose capture is seldom attempted by the northern whalers, in consequence of their rapid flight when attacked giving little chance of success, were seen at a few leagues distance from the land, but none were met with in-shore.

MONODON Monoceros (Linné):—*Narwal* or *Unicorn* of the whalers.

This animal occurred in considerable numbers near the coast. We killed four of them during our stay; one of which being a female, had an external tooth or horn, which is an appendage rarely, if ever before, observed in this sex.

II. AVES.

ANAS Bernicla:—*Brent Goose.*

Only a solitary specimen of this bird was, I think, seen during our stay on the coast.

ANAS Mollissima:—*Eider-Duck.*

This bird, so common in some parts of Greenland, was only met with in small numbers.

ALCA Arctica:—*Puffin* or *Greenland Parrot.*

Not numerous.

ALCA Alle:—*Little Auk* or *Roach.*

This was the most numerous species seen. The sea, in some places, was literally covered with them. Nearly half a million were supposed to have passed within 200 or 300 yards of the ship, in the course of twelve hours.

PROCELLARIA Glacialis:—*Petrel, Fulmar,* or *Mallemuk.*

Numerous throughout the polar seas.

COLYMBUS Grylle:—*Tyste* or *Doveca.*

Pretty frequent.

COLYMBUS Troile:—*Foolish Guillemot* or *Loom.*

Met with in considerable numbers.

STERNA Hirundo:—*Great Tern* or *Sea Swallow.*

Seen near Bontekoe Island in the month of June, and also on Jameson's Land in July.

LARUS Rissa :—*Kittywake.*

Common throughout the Greenland Seas.

LARUS Parasiticus :—*Arctic Gull.*

Seen occasionally; but not numerous.

LARUS Crepidatus :—*Black-toed Gull* or *Boatswain.*

Seen at Cape Swainson, &c.; but not numerous.

LARUS Eburneus :—*Ivory Gull* (Phipps), or *Snow Bird.*

Seen in considerable numbers along the coast.

LARUS Glaucus :—*Burgomaster.*

Many of these birds were met with, and several very fine specimens were shot and preserved.

EMBERIZA Nivalis :—*Snow Bunting.*

Not numerous.

CHARADRIUS Hiaticula :—*Ring Plover.*

Shot at Cape Hope, and on Jameson's Land.

TETRAO Lagopus ?—*Ptarmigan ?*

This bird, of which several were seen by the sailors, and some of them killed, both on Jameson's Land and Traill Island, was not brought on board. It was so tame that it was knocked down with stones. The sailors described it as a partridge. Professor Jameson thinks it was most probably the white grouse, or ptarmigan, which is mentioned by Fabricius, Giesecké, and Ross, as occurring in Greenland. The tameness is indeed somewhat characteristic of this species, even in those found among the mountains in Scotland.

FRINGILLA Linaria ?—*Lesser Redpole.*

Several birds, supposed to be of this species, were seen among the rocks at Cape Hope, and on different parts of Jameson's Land. They are mentioned by Müller and Giesecké, as natives of the Western Coast of Greenland,

III. PISCES.

SQUALUS Borealis :—*Greenland Shark.*

This shark grows to the length of twelve or sixteen feet, or more, and is remarkable for a vermiform appendage to each of its eyes, affixed to the edge of the iris. It is a recent species, first described in the Account of the Arctic Regions, Vol. I. p. 538.

GADUS Carbonarius (?) :—*Coal-Fish.*

The remains of some fishes, supposed to be of this species, were found by my father in the stomach of a narwal, killed within sight of the coast of Greenland.

RAIA Batis :—*Skate.* Found almost entire, by my father, in the stomach of a narwal.

PLEURONECTES ——— ?—The remains of a fish of this genus was likewise found by my father, in the same narwal that afforded the last.

IV. MOLLUSCA.

CLIO Helicina :—*Sea Snail.* Very numerous in some parts of the Greenland Sea near the shore.

CLIO Borealis :—Seen in vast quantities near the coast of Greenland.

SEPIA ———? *Cuttle-Fish.* Frequently found in the stomach of the narwal, of which animal it seems to constitute the most general food.

V. INSECTA.

1. PAPILIO Palæno (Linn.) *Le Solitaire* of the French. This butterfly was brought from Jameson's Land. It

occurred in great numbers both here, at Cape Lister, and at Cape Hope.

2. Papilio Dia (Linn.)

Found along with the former, and likewise in considerable numbers.

Besides these butterflies, several other insects were seen, and specimens of some of them collected; but these received so much injury on their passage to England, that the species could not be satisfactorily made out. The following memoranda, however, respecting the imperfect specimens, and the description of the two butterflies above mentioned, have been kindly furnished to me by Professor Jameson, and appear to me to be interesting to the entomologist.

Memoranda by Professor Jameson.

The few insects presented for determination, were in so mutilated a state, that two only of them could be satisfactorily made out. The first, No. 1., is the *Papilio Palæno*, Lin. Fa. Suec. 1041.; the other, No. 2., *Papilio Dia*, Lin. Fab. Mant. Ins. ii. p. 61. n. 581. Both species are now, for the first time, enumerated as productions of Greenland; for the only butterfly met with in this country, and that on the opposite coast by Fabricius, and described in his admirable Fauna Grœnlandica, is the *Papilio Tullia* of Müller, Prodr. 1319. Fabricius enumerates eight species of moth or phalæna as natives of Greenland: one of the four specimens above enumerated was of that genus; but its mutilated state prevented the determination of the species. Five Tipulæ are described by Fabricius, and the fourth specimen was evidently of that genus, having a black abdomen and clouded wings; but the species,

owing to the state of the specimen, could not be determined.

The mosquitoes mentioned by Captain Scoresby, were probably the *Culex pipiens*, Lin., or Gnat, which Fabricius and Gieseké enumerate amongst the insects of Greenland. The *Honey Bee* seen by Captain Scoresby, may have been the *Apis alpinus*. Lin., concerning which Fabricius remarks, "Habitat passim, in sinubus frequentior, mel suum ex plantis sedulo sub stridore colligens, in fanos suos subterraneos, ubi hibernat. Grœnlandi mel suis inuentum fugere solent, nec tamen magni habent."

My friend and pupil Mr James Wilson, also examined the insects, and added the following interesting notes. No. 1. is clearly the *Papilio Palæno* of Linnæus, called *Le Solitaire* by the French. It is found in France, Germany, and Sweden. I do not know whether it has yet occurred in Britain; but its most nearly allied species, the P. edusa, (common in Spain), is figured by Donovan as an English insect. It belongs to the section *Danai candidi;* and, like many of these, is subject to a considerable range in the shade of its colouring. Yellow is the prevailing and characteristic colour; but in some it admits of a shade of green; in others, of a tinge of orange. This interesting Greenland specimen belongs to the latter variety. The dark band which marks the exterior margins of the wings, is likewise known to vary from black to brown. This band is sometimes entire, and sometimes clouded or broken. I mention these particulars, to show that there is no reason for ranking the specimen in question as a distinct species, merely because it may not tally in every particular with the individuals preserved in other cabinets.

"Le papillon soufre" (*P. Palæno Lin., Fabr.*) says Latreille, "est d'un jaune pale; la *bordure brune* des ailes est

tachete dans les deux sexes ; les ailes inferieures n'ont qu'*un seul œil* bien distinct au milieu du disque inferieur."

According to D'Engramelle, in his beautiful work on the European Papiliones, " les ailes inferieures n'ont *pas de tache* au milieu; les dessus des quatre ailes est d'un jaune pale un peu verdâtre, avec un *bordure noir* qui n'est *pas coupée*; en dessous la partie qui correspond à cette bordure est d'un verd clair."

This genus is referrable to the modern genus called *Colias*, proposed by Fabricius and adopted by Latreille. Should it occur like the *Colias edusa* (to which it is so nearly allied), in the south of Spain, its geographical distribution will extend over about 32 degrees of latitude. The generic characters are: " *Palpi* valde compressi, articulo ultimo brevissimo. *Antennæ* breves, in capitulum obconicum sensim abeuntes." The specific characters are : " *Colias Palæno*,—Alis integerrimis rotundatis flavis apice nigris margineque flavis; posticis subtus puncto argenteo. Faun. Suec. 1021. *Habitat.* in Europæ *Pteride aquilina*."

No. 2.—The specimen marked No. 2. belongs to that division of the genus *Papilio*, called *Nymphalcs Phalerati* by Linnæus; and to that section, well named by Latreille *Perlati*, from the beautiful pearly spots with which the under surface of the inferior wings is usually adorned. I should consider it as an interesting variety of the *Papilio Dia* of Linnæus, rather than as a new species. It occurs in England, is common in Austria, and is likewise well known in France under the name of *La Petite Violette*. Its discovery in Greenland, therefore, gives it a wide geographical range, from the Austrian territory south of Vienna, to Jameson's Land in Greenland. This insect is described and figured by D'Engramelle, Plate XV. No. 21. It is

one of the group of butterflies known to English Entomologists by the name of Fritillavies. It is thus described by Mr Stewart in his Elements of Natural History.

" *Papilio Dia.* Wings tawny, with black spots; the posterior wings purplish below, with yellow and silvery spots at the base, and a silvery obsolete fascia in the middle.

" Inhabits Europe. B. Esp. I. Tab. 16. f. 4.

" Larger than the *Lucina,* but less than the *Cuixia,* which it resembles in the upper surface of the wings. The caterpillar feeds on the Kola; it is grey, with alternate rows of white and furruginous spines; the pupa yellowish, variegated with black."

Latreille's description is much the same: " Ailes fauves, tres tachetées de noir; les inferieures d'un pourpre foncé en dessous, avec des taches argentées et de taches jaunes; une bande plus claire et un ligne d'yeux argentes; un serie de petites taches argentées au bord posterieur. En Mai et en Août, sur la violette."

The special habitat given by Linnæus is Austria. I may add, that the chief variation observable between Captain Scoresby's specimen, and others with which I have compared it, is in the figure of the silvery spots on the under surface of the inferior wings. In the Greenland specimens, the larger spot is bifurcated at either end, in the Continental it is irregularly oval, or egg-shaped.

I conclude these memoranda by observing, that it had been previously shewn by the *Fauna Grœnlandica* of Otho Fabricius, that the entomology of Greenland, so far as it was known, bore a close resemblance to that of Denmark, Sweden, and more especially Swedish Lapland; and the observations of Captain Scoresby forms a link which

connects it with still more southern countries. The distance between Spain and Greenland is no doubt great, and the range of climatic temperature still greater than even a more extensive separation under two points of lower latitude would produce. Yet, in so far as regards mere latitudinal distance, we shall find the extreme points, in the distribution of several other species, to be separated by a greater number of degrees. The *Papilio cardui*, or Painted Lady Butterfly, for example, which is a well known English and Swedish insect, is likewise found at the Cape of Good Hope, and the *Sphinx Celesio*, or Silver Stripe Hawk-moth, one of the rare British Sphinges, is known to occur in the Isle of France. A coleopterous aquatic insect, the *Dytiscus griseus*, well known in Piedmont and the South of France, has also been found in the waters of Bengal.

VI. CRUSTACEA.

GAMMARUS Arcticus (Leach) :—*Mountebank Shrimp.*

This species, which is recent, is described in the Account of the Arctic Regions, Vol. I. p. 541.

CANCER Boreas.—Found in the stomach of the narwal.

CANCER Ampulla.—Found in the stomachs of the narwal and shark.

ONISCUS Ceti (Linn.); LARUNDA Ceti (Leach, Crust. Pl. 21):—*Whale's Louse.* Found generally adhering to the skin of the mysticetus, under the fins, &c.

VII. RADIARIA.

ASTERIAS Caput Medusæ:—*Star Fish.*

Several specimens of this beautiful animal were found

adhering to a whale line, that had lain on the bottom of the sea for some hours, off Traill Island.

VIII. PROTOZOA.

MEDUSA :—*Sea Blubber.* Various species were met with, and in considerable quantities; but only the M. pileus was recognised. These animals, with different species of shrimps, seem to contribute the principal food of the mysticetus.

No. IV.

METEOROLOGICAL TABLE, including the daily Latitude and Longitude of the Ship.

Remarks on the Meteorological Table, &c.

This Register is by no means so complete as I could have wished. The variety of occupations that I was engaged in, prevented me from paying that attention to it that it might otherwise have met with.

The Latitudes and Longitudes marked with an asterisk, were deduced from celestial observations, and are consequently accurate.

The direction of the Winds is reckoned from the *true* meridian, the correction for variation being applied to the direction by the compass.

For the sake of brevity, in the column of Winds, I have distinguished the progressive veering of the wind between two points, and the progressive change between two denominations of strength or "Force," by the intervention of the particle *to*. And the same application of the word *to*, has been used to connect the winds of two contiguous days.

APRIL 1822.

	Latitude.	Longitude.	Thermometer. Max.	Min.	Med.	Barometer.	Winds.	Weather, &c.
1	Loch	Ryan.	—	—	—	—	NW.erly	Fine weather
2	—	—	—	—	—	—	NNW	Ditto
3	—	—	—	—	—	—	NW to N	Fresh breezes
4	—	—	—	—	—	—	NW.erly	Ditto
5	—	—	—	—	—	—	NW.erly	Mod. or fresh br.
6	—	—	—	—	—	—	NW.erly	Rainy
7	—	—	—	—	—	—	Var	Light br.; calm
8	North	Channel,	—	—	—	—	NE to NNW	Fine weather
9	55.51 °	° ′	—	—	—	—	NNE to NE	Light winds
10	56.26 °	7.40 W.	—	—	—	—	to E and S	Ditto
11	57.47 °	9.16	—	—	—	—	ESE to ENE	Fine weather
12	60.21 °	8.46	—	—	—	30.18	to E	Brisk breezes
13	62.42	8.16	—	—	—	—	E	Ditto; hazy
14	64.32	7.46	—	—	—	—	E	*Made the ice*
15	64.41	6.31	43	33	38	30.10	E b S to SE	Fine aurora bor.
16	65.35	4.23	—	—	34	30.02	SE to S	Fine wr.; calm
17	65.58	3.53	36	34	35	29.98	E.erly; W.erly	Aurora borealis
18	66.49	3.0	35	34	34.5	29.80	SE to S	Foggy
19	68.45 °	0.8	38	34	36	29.78	SE to E b S	Fresh br.; calm
20	69.30	0.18 E.	36	32	34	29.45	NNE	Calm; fresh br.
21	69.24 °	3.26	38	34	36	29.35	to N	Hard gale
22	69.37 °	5.50	—	—	33	29.60	to W & SSW	to calm
23	70.23 °	6.50	42	36	39	29.95	Variable	Weather-gall
24	71.56	8.9 °	38	35	36.5	29.80	E.erly	Fresh gale
25	75.5 °	9.18	40	38	39	29.95	E.erly	Ditto; hazy
26	77.16	8.8	36	34	35	29.95	to SE b S	Ice
27	79.36	8.0	—	—	34	29.90	S.erly; ENE	Spitzbergen
28	80.30	9.0	—	—	34	—	Var	Ditto in sight
29	80.31 °	8.0	32	— 2	15	—	SW, NNW	Strong gale
30	80.19 °	3.0	10	— 2	7	29.96	Var	to calm

MAY 1822.

1822.	Latitude.	Longitude.	Thermometer.			Barometer.
			Max.	Min.	Med.	
May 1	80°34′	0°30′ E.	8	0	4.0	30.00
2	79.44	1.0	18	4	9.3	29.80
3	79.41 *	4.0	26	20	23.0	29.70
4	78.26 *	2.30	20	14	17.0	29.98
5	78.27 *	5.0	24	14	19.0	30.00
6	79.31 *	4.0	26	20	23.0	29.80
7	79.35	2.0	26	12	19.0	—
8	79.45	1.50	12	4	8.0	—
9	79.45	0.30	2	— 8	— 3.0	30.18
10	79.50	1.0	8	— 5	+ 1.7	30.15
11	79.58	2.0	14	+ 8	11.3	30.20
12	79.59	2.30	16	12	14.0	30.15
13	79.40 *	2.0	22	16	19.0	30.20
14	79.26 *	1.50	22	14	18.0	30.10
15	79.30 *	1.50	20	14	17.0	30.12
16	79.30 *	1.36	26	22	24.0	30.12
17	79.30	1.25	26	24	25.0	30.00
18	79.24	1.20	—	—	24.0	29.50
19	79.12	1.0	26	20	23.0	29.50
20	79.0 *	1.0	24	20	22.0	29.58
21	77.42 *	2.0	26	25	25.5	29.60
22	76.24 *	0.10	30	24	27.0	29.95
23	75.43 *	2.0 W.	30	26	28.0	29.90
24	75.48	3.30	30	25	27.5	29.75
25	75.50	4.20	34	30	32.0	29.15
26	75.52	3.30	30	28	29.0	29.55
27	75.30	3.50	34	32	33.0	29.35
28	75.26	3.58	36	32	34.0	29.20
29	75.16	5.20	34	32	33.0	29.15
30	75.8	5.16	35	32	33.7	29.15
31	74.46	4.50	36	30	33.0	29.10

MAY 1822.

	Winds.		Meteors and Weather.	Situation and Remarks.
	Direction.	Force.		
1	S, to W to N b E	Mod. to fresh br.	Frost-rime	Near the N. ice
2	SSW to E	Calm to fr. gale	Snow	Among ice
3	to NE	Fresh gales	Sunshine	Ice-streams
4	to N b W; var	Strong gale	Frost-rime	Ditto
5	NNW to WNW	Fresh breezes	Cloudy	Much ice near
6	W to N	to mod. breezes	Fine weather	Much open ice
7	to NW b N	to strong gale	Snow	Open ice
8	N to NE	to mod. breezes	Frost-rime	Ditto
9	NNE	Fresh gale	Ditto	Ditto
10	NNE	Fresh gale	Ditto	Ditto
11	to NNW	to fresh breeze	Ditto	Ditto
12	N to ENE	Fresh breeze	Snow	Ditto
13	to SE	to light breeze	Snow showers	Ditto [&c.
14	to ENE	Fresh breeze	Cloudy	Much ice; floes,
15	to N; W.erly	Moderate breeze	Ditto	Ditto
16	E.erly; var	Light breeze	Clear	Ship frozen up
17	SSE to ESE	Moderate breeze	Cloudy	Ship beset
18	ESE	Ditto	Hazy	Ditto
19	to N.erly	Light winds	Clear	Ditto
20	NW to NE	Moderate breeze	Ditto	Ship released
21	N to NW	Brisk breezes	Snow showers	At sea
22	to W	Calm to fresh br.	Ditto	Ditto
23	to SW	Mod. or fresh br.	Ditto	Open pack
24	to var	Light breeze	Thick snow	Crowded ice
25	Variable	to hard gale	Fog; snow	Ditto
26	W.erly, N, E	to calm	Fog	Ditto
27	E to S	to fresh breeze	Foggy	Ditto
28	E	Moderate breeze	Ditto	Ditto
29	to SSW	Fresh breezes	Fog; sleet	Ditto
30	to ESE	Fresh gales	Fog; snow	Ship beset
31	S, NNE to NW	Hard gales	Snow	Ditto

JUNE 1822.

1822.	Latitude.	Longitude,	Thermometer.			Barometer.
			Max.	Min.	Med.	
	° ′	° ′				
June 1	74.39	4.10 W.	32	30	31.0	30.50
2	74.36	7.20	34	30	32.0	30.70
3	74.26	8.10	34	30	32.0	29.80
4	74.20	9.30	32	30	31.0	29.84
5	74.18	10.20	34	25	29.0	29.70
6	74.14	11.10	32	26	29.0	29.60
7	74.18	13.0	—	—	32.0	—
8	76.6		34	27	30.5	29.30
9	74.1 *		36	27	31.5	29.50
10	73.54 *	16.39 *	36	27	30.5	—
11	73.43 *	17.39 *	36	27	30.5	—
12	73.40	17.45	40	30	35.3	—
13	73.35	17.50	40	30	35.0	—
14	73.36 *	17.54 *	44	32	38.0	29.70
15	73.34	17.30	34	30	32.0	—
16	73.24	16.40	—	—	—	—
17	73.17 *	17.40 *	46	32	39.8	—
18	73.1 *	18.1 *	48	34	41.0	—
19	72.51 *	16.20	50	36	43.0	—
20	72.30	15.40	—	—	—	—
21	72.20	17.20	56	44	47.0	—
22	72.5	18.50	44	32	38.0	—
23	72.10	18.50	36	34	35.0	29.50
24	72.0	18.30	34	32	33.0	29.45
25	71.40	18.40	34	30	32.0	—
26	71.9 *	18.48 *	34	31	32.7	—
27	71.10	18.10	34	32	33.0	—
28	71.20	17.55	33	32	32.5	29.65
29	71.25	18.45	34	30	32.0	—
30	71.22	16.55	34	32	33.0	—

JUNE 1822.

Days.	Winds.		Meteors and Weather.	Situation and Remarks.
	Direction.	Force.		
1	NW to SW	Str. gale to fr. br.	Snow; cloudy	Floes & drift-ice
2	to S	Fresh breeze	Cloudy	Many Floes
3	to E; var	to Calm	Foggy; cloudy	Surrounded by do.
4	W.erly; S	to Fresh breeze	Thick snow	Partly beset
5	to NW	Fresh breeze	Foggy	Ditto
6	S to E and NE	Mod. br. to Calm	Ditto	Ditto
7	S	to Strong breeze	Ditto	Fields and floes
8	var.	Fr. gale to Calm	Foggy; clear	*West Land* in sight
9	NNE; var	Light breeze	Clear	Ditto; much ice
10	Variable	to Mod. br.; Calm	Ditto	Var. 42° 8′ W.
11	Ditto	to Mod. breeze	Ditto	West Land in sight
12	Ditto	Moderate breeze	Ditto	Ditto; much ice
13	Ditto	to Light breeze	Clear; foggy	Ditto; ditto
14	Ditto	Fresh breeze	Snow; fog	Numerous floes
15	Ditto	Fr. breeze; Calm	Foggy	Ditto
16	NNE to WNW	to Strong gale	Fog; cloudy	Large field
17	to SW	Fr. gales; mod. br.	Clear	Var. 43° 15′ W.
18	to W.erly	Moderate breeze	Ditto	Bontekoe I. NbW
19	Var	to Calm	Ditto	Ditto in sight
20	E.erly	Mod. br.; Calm	Ditto	Much ice
21	SW	to Mod. breeze	Clear; hazy	Drift-ice & floes
22	to S	Moderate breeze	Cloudy; foggy	Ditto
23	Var	Light br.; Calm	Fog; snow	Ditto
24	NE to N	Strong gale	Snow	Ditto
25	N	Fresh gale	Thick snow,	Ditto
26	N; NW	to Fresh breeze	Clear	Ditto
27	W to S	to Calm	Clear; foggy	Ditto
28	SW; SSW	Fresh breeze	Foggy; hazy	Ditto
29	SW; SSE	to Mod. breeze	Clear; foggy	Ditto
30	to NE	Moderate breeze	Thick fog	Ditto

JULY 1822.

1822.	Latitude.	Longitude.	Thermometer.			Meteors and Weather.
			Max.	Min.	Med.	
	° ′	° ′				
July 1	71.20	17.30 W.	—	—	—	Rain
2	71.15	18.5	42	29	36.3	Foggy; clear
3	71.8	18.15	35	33	34	Cloudy; foggy
4	70.50	18.15	—	—	34	Foggy
5	71.7 *	18.40 *	35	32	33.5	Cloudy; foggy
6	71.17	18.15	35	32	33.5	Snow; rain
7	71.20	17.45	—	—	32	Foggy
8	71.28	19.42 *	—	—	—	Clear; curious ref.
9	72.11 *	17.55	36	30	33	Curious refraction
10	72.10	18.0	34	30	32	Thick fog
11	72.8	18.15	34	30	32	Ditto
12	71.20	20.0 *	—	—	—	Fog; clear
13	71.24 *	19.15	34	29	31.5	Thick fog
14	71.55	17.15	38	34	36	Constant fog
15	71.50	17.20	—	—	—	Ditto
16	71.40	17.35	40	34	36.7	[tion Unequal refrac-
17	72.33 *	19.9 *	—	—	—	Ditto
18	72.0	16.0	—	—	—	Ditto
19	71.7 *	19.5	45	40	42.5	Clear; uneq. ref.
20	70.45 *	21.9 *	36	30	33	Fog; clear
21	70.30	20.2	38	31	34.5	Foggy; hazy
22	70.37 *	20.15	32	30	31	Thick fog
23	70.36 *	21.14 *	33	31	32	Foggy
24	70.29	21.25	—	—	—	Foggy; clear
25	70.25 *	22.10 *	—	—	—	Clear; warm wr.
26	70.25 *	22.22 *	—	—	—	Hot weather
27	70.17 *	21.57	—	—	—	Cloudy
28	70.0	20.30	—	—	—	Cloudy; clear
29	69.36 *	21.39 *	—	31	—	Clear
30	69.35 *	21.45	—	—	—	Ditto
31	70.25 *	19.11 *	48	32	40	Fine clear weath.

JULY 1822.

Days.	Winds.		Situation and Remarks.
	Direction.	Force.	
1	ENE to S	Light breezes	Numerous floes
2	E.erly	to Calm	Many whales
3	N b E to NNW	to Fresh gale	Much ice
4	to WNW	Strong gale	Land in sight
5	NW to W	Fresh breeze	Ditto
6	NW.erly	Fresh gale	Open ice
7	NW.erly; var	to Calm	Ditto
8	W to S	Moderate breezes	Land in sight
9	to SSE	Moderate breezes	Ditto
10	to SE	to Light breezes	Much ice
11	SSE	to Fresh breezes	Open ice
12	Var	Fresh gale to Calm	Land in sight
13	SSE to SE	Moderate breeze	Open ice: field
14	to ENE	Light breeze	Large field
15	S.erly	Fresh breeze	Ditto
16	S	Moderate breeze	Fields and floes
17	to SW and NNE	Fresh breeze	Land in sight
18	N to NW	to Moderate breeze	Fields and floes
19	S; var	Moderate breezes	Near the coast
20	S to SSW	to Fresh gale	Variation 44° 30′ W.
21	SSW	Strong gale	Large floes
22	SSW	Ditto	In the Land-water
23	SSW	to Moderate breeze	Very near the land
24	to SW	Fresh gale; light br.	Landed at *Cape Lister*
25	Variable	Light breezes	In Scoresby's Sound
26	W; E; var	Ditto	Landed at *Ca. Stewart*
27	E.erly; S	Fresh gale, moder.	Landed at *Ca. Brewster*
28	Var	to Light breeze	Loose ice and icebergs
29	NW.erly	to Calm	Land bold
30	Var	Light breeze; calm	Numerous icebergs
31	SSE	Light breeze	Land in sight

AUGUST 1822.

1822.	Latitude.	Longitude.	Thermometer.			Barometer.
			Max.	Min.	Med.	
Aug. 1	71.20	19.45 W.	40	34	36.7	—
2	71.50	20.35	42	32	37	—
3	72.0	19.16	36	34	35	—
4	72.0	19.11	34	34	35	—
5	72.2	19.15	36	30	32.7	—
6	72.11	19.5	42	31	36.5	—
7	72.40	18.45	40	33	36.3	—
8	72.30	17.15	38	34	36	—
9	72.25	16.50	—	—	33	29.30
10	72.10	20.0	—	—	33	29.33
11	72.11	21.45	—	—	33	29.30
12	72.11	21.45	—	—	33	29.35
13	72.3	21.20	35	33	34	29.50
14	71.57	21.22	—	—	—	—
15	72.2	21.9	—	33	—	—
16	72.0	21.0	—	—	—	—
17	71.53	20.58	36	34	35	—
18	71.55	20.50	—	—	—	—
19	71.51	20.50	—	—	—	—
20	71.50	20,43	—	—	—	—
21	71.50	20.30	—	—	—	—
22	71.48	20.15	36	34	35	—
23	71.40	20.25	34	32	33	29.38
24	71.22	20.35	36	32	34	29.60
25	71.18	20.43	38	35	36.5	29.67
26	71.25	20.37	38	36	37	29.70
27	71.50	19.50	38	34	36	29.73
28	71.40	16.30	—	—	38	—
29	70.30	15.10	—	—	38	29.75
30	70.30	15.50	—	—	—	—
31	70.24	15.10	—	—	38	—

AUGUST 1822.

Days.	Winds.		Meteors and Weather.	Situation and Remarks.
	Direction.	Force.		
1	S	Light to fresh br.	Constant fog	Open ice
2	S, N	Fresh breeze	Foggy	Saw land
3	N, S.erly	to Calm	Ditto	Much ice
4	SSE	Fresh breeze	Constant fog	Ditto
5	to SE	to Light breeze	Ditto	Ditto
6	S	to Fresh gale	Ditto	Crowded ice
7	to SSE	Fresh gales	Ditto	Ditto
8	S to SE	Ditto	Rain or fog	Ditto
9	N	Ditto	Heavy rain	Floes and drift-ice
10	N	Ditto	Ditto	Landed on *Traill*
11	N	Hard gale	Ditto	[*Island*
12	N	Strong gale	Ditto	Near the land
13	N	to Moderate br.	Ditto	Land in sight
14	Variable	to Calm	Fog; clear	Var. 43° 22′ W.
15	Ditto	Light airs	Clear	Numerous whales
16	SE.erly; var	Ditto	Ditto	Land in sight
17	to N	Strong gale	Heavy rain	Much ice
18	N	Ditto	Ditto	Ditto
19	N	to Calm	Rain; fog	Near land-ice
20	Variable	Light br.; calm	Fog; clear	Var. 43° 24′ W.
21	S.erly	Moderate breeze	Foggy	Near land-ice
22	to NNE	Fresh breeze	Ditto	Ditto
23	N to NW	Tremendous gale	Rain; snow	Ship grounded on
24	NW	to Light breeze	Snow; clear	[the ice
25	Variable	to Calm	Clear	Near land-ice
26	Var.; N	to Mod. breeze	Clear; foggy	Near the coast
27	N b W	Fresh breeze	Rain; fog	Left the coast
28	N to E	Fr. gale; mod. br.	Thick fog	Much ice
29	E.erly	to Light breeze	Ditto	Ditto
30	S.erly	Calm; mod. br.	Ditto	Left the ice
31	to SW	Moderate breeze	Ditto	At sea

SEPTEMBER 1822.

1822.	Latitude.	Longitude.	Thermometer.			Barometer.
			Max.	Min.	Med.	
	° ′	° ′				
Sept. 1	69.28	13.40 W.	48	46	47	—
2	68.26	12.15	47	45	46	28.35
3	67.14	12.12	46	42	44	28.35
4	64.56 *	9.22	—	—	45	28.60
5	63.1 *	9.25	—	—	48	28.90
6	62.5	7.57 *	—	—	47	29.10
7	60.28 *	7.30	52	48	50	29.10
8	59.38	7.13	52	50	51	29.15
9	58.26 *	7.30	53	48	50	29.50
10	58.5 *	7.45	—	—	—	29.50
11	58.25	8.50	—	—	—	28.50
12	57.15	8.0	—	—	—	29.80
13	55.50	7.40	58	—	—	—
14	55.28	6.59	—	—	58	29.90
15	55.22	6.32	—	—	—	—
16	55.30	6.30	—	—	—	—
17	54.48	5.30	—	—	—	—
18	53.30	4.3	—	—	—	—
19	Liverpool	Channel.	—	—	—	—

SEPTEMBER 1822.

Days.	Winds.		Meteors and Weather.	Situation and Remarks.
	Direction.	Force.		
1	E.erly	Fresh breeze	Thick fog	At sea
2	E.erly	Strong ga.; mod.	Rain	Ditto
3	to NW	Hard gale	Ditto	Ditto
4	W to N, E	to Fresh gale	Cloudy; rain	Ditto
5	Variable	Fresh gale	Rain	Ditto
6	S.erly; NNW	to Strong breeze	Ditto	Made *Faroe*
7	Variable	Fresh gales	Ditto	At sea
8	W to N	to Mod. breeze	Rain; haze	Ditto
9	N to W	to Fresh gale	Lightning	Made the *Lewis*
10	to S and SE	to Strong gale	Ditto	Off Flannen Isl.
11	to S, W and NW	Hurricane	Rain; hazy	Near land
12	NW b N	to Fresh gale	Cloudy	Off Barra Head
13	to E	to Mod. breeze	Fine weather	Ireland
14	to SE	Fresh gales	Cloudy	Off Inishoan
15	ESE	Ditto	Ditto	Off Rachlin Isl.
16	to SSE	to Fresh breeze	Hazy	Ditto
17	NNW	Calm to fresh br.	Rain; clear	Off Port-Patrick
18	E.erly	Fresh breeze	Hazy	Off Liverpool
19	NE.erly	Ditto	Clear	Ditto

No. V.

JOURNAL of PROCEEDINGS on Board of the Hercules of Aberdeen, Captain THOMAS FAIRBURN, on the East Coast of West Greenland, from the 22d of August, to the 11th of September 1822.

THE following narrative is taken, with little more than a few verbal alterations, from a communication by Mr Fairburn. It is particularly interesting to the whale-fisher. It gives an account of the capture of two whales at a very late season of the year, and includes some important observations, strikingly corroborative of my remarks on the dangerous nature of the eastern coast of Greenland, as a fishing station, at the end of summer. It also proves, what I indeed fully expected, that the packing of the ice upon the coast at this season, took place in other parallels than those to which my observations extended.

After many unsuccessful searches for fish, between the latitude of 80° 20′ N. and the parallel of Jan Mayen Island, where I was on the 22d of July, with a *clean* ship, and not a fish to be seen, I was determined, God willing, to proceed to the north into Lat. 74°, and there go in with the land, where I had seen fish late in the season in 1820. Hence I proceeded to the north and west, as fast as circumstances would admit.

On the 17th of August, in latitude 73° 30′, fell in with the King George of London, and, being late in the season, we agreed to keep company. This ship had three fish, about 35 tons of blubber, that were taken in the fore part of the season.

Thursday, Aug. 22d.—We came to a compact barrier of floes and loose ice to the NE., and proceeded to the westward, keeping to the northward as much as possible. Had stormy weather all night, and in the morning (Friday 23d), having an increasing gale from the eastward, accompanied with thick weather, it was necessary to make fast; and accordingly both ships were secured to the best floe we could find. At 11 A. M. the gale was very heavy, with much rain. The floes slueing about endangered us; but, fortunately, having the advantage of a good natural dock, in which we moored head and stern, we were able to keep clear of the floe when brought to windward, where there was only windlipper on the weather edge. The other ship, in the act of shifting under a point of the floe, had the misfortune to go adrift, and, endeavouring to set his main-topsail, it blew to shivers. On seeing this, and knowing his ship's company were not in the best of spirits, I instantly sent a boat and crew on board to their assistance, and they got to windward again, after about three hours of complete hard beating amongst heavy ice. In the mean time, we made a good hole, and placed ice-anchors in readiness for him to catch hold of. At 8 P. M. the gale abated, and we had moderate weather.

Saturday, Aug. 24.—Had light easterly winds and fog all the day, so that we lay fast to the floe.

Sunday, Aug. 25.—At 9 A. M., having fine clear weather, with a light wind from the northward, both ships cast off, and proceeded to the westward, amongst sailing ice.

At noon had a good observation in 73° 41′ N. The land was in sight from WNW. to NNE., which I supposed was fifty or sixty miles distant; and the ice had every appearance of affording a favourable passage in-shore. The wind having shifted to the westward, we proceeded to the northward with all possible sail; and at 4 P. M., I saw two fish from the mast-head, and boats were sent out on watch.

Monday, Aug. 26.—At 4 A. M. I was welcomed on deck with the noise of a second boat lowering down (a token of whales), and was glad to behold as fine a morning as ever I saw in Greenland. Our situation had a favourable appearance; three fish had been seen already, and the ice was fine and open every way, a small floe and a little brash-ice only separating us from the land water, which appeared to be entirely free from ice. The nearest spot of land was a small island (Jackson's Island), at NNW. At 6 A. M. the King George got fast to a fish, but lost her, by the line breaking. We now reached into the open water, and soon saw fish in every direction, all apparently travelling to the north-westward. From 4 A. M. until 7, the fish were numberless; but notwithstanding our boats pulled about the whole day, it was 8 P. M. before we had luck to get fast. We fortunately got her killed before dark, and had fine weather all night, so that we had her fiensed by morning. Amongst this run of fish, the king George was fast to three, but lost them all.

Tuesday, Aug. 27.—All this day light NE. winds, and fine weather. A fine fish appeared this morning, but got away. We reached the ships in-shore, but, seeing no fish, stood off to the ice. The night advanced with strong ENE. winds, and thick weather. Having plenty of water, we shortened sail, and dodged all night. In the morning

our partner was out of sight, having, as I supposed, stood to the eastward.

Wednesday, Aug. 28.—Strong ENE. winds and cloudy weather. We plyed to the NE. amongst floes and loose ice, without seeing a fish. It was dark and cloudy all night, and we dodged under easy sail until morning.

Thursday, Aug. 29.—All this day had light ENE. winds and fog, which opportunity we took to make-off our fish, while lying fast to a floe. Gloomy weather all night.

Friday, Aug. 30.—This day commenced with light SW. winds and fog. Cast off at daylight, and drifted to the NE. amongst loose ice. At 9 A. M. made fast to a floe, and sounded in 83 fathoms mud, latitude supposed 74° 15′ N. Had gloomy weather and intervals of calm through the night.

Saturday, Aug. 31. commenced with more favourable weather, and light ESE. winds. At 5 A. M. cast off and proceeded to the NE. amongst sailing ice. At noon had clear weather, and strong ENE. winds. A great change had now taken place in the situation of the ice, the floes having set more in-shore, and the land-water being in a great measure covered with drift ice, which had evidently come from the NE. We had yet, however, plenty of room to sail in any direction, and I stood in-shore amongst sailing ice. At 3 P. M. was within three miles of the land, without seeing a fish. It was my design to have plyed to windward into a large lane of water, entirely free from ice in-shore, in order to dodge there all night, with an intention, if the morning was fine, to send the boats in-shore in search of fish. But, on seeing the King George to leeward, I endeavoured to join him, if possible, before dark; but at 4 P. M. coming on thick, I stood to the SE., being the most likely road to fall in with him, for he was

standing off when last seen. At 11 P. M. made fast to a floe, and had strong winds all night.

Sunday, Sept. 1. commenced with strong ENE. gales, and cloudy weather. At 5 A. M. sighted the other ship. Cast off, and, having joined the King George, plyed to windward to a good floe, where we secured both ships at 4 P. M., in order to lie still until morning. Strong ENE. gales and cloudy all night.

Monday, Sept. 2.—More moderate and clear weather. At 8 A. M. cast off, and stood towards the land amongst floes and loose ice. At noon was nearly in-shore, in latitude 73° 37′ N.; but on seeing no fish, and finding it impossible to beat to the NE. to the place from whence we had drifted, in any reasonable time, we steered from the wind, and proceeded along the land to the SW. amongst floes and very heavy pieces of loose ice. Passed some large icebergs; and on steering between Broer Ruys' Land and Bontekoe Island, amongst some very ragged ice, we saw a fish, which we struck at 7 P. M., and got her killed and alongside at 11 P. M. The King George having sent a boat to our assistance, struck at a loose fish, but lost her, with half a line. Both ships were made fast to a floe, and we began to flench; but being dark, and having two boats away getting in the lines, which were thirteen in number, we only got slowly on. At midnight, strong ENE. winds and snow showers. We repeatedly fired a gun, and had a light at the mast-head, during the night.

Tuesday, Sept. 3. commenced with strong gales and snow. At 3 A. M. got one of the boats and crew on board, after a wet and laborious pull to windward. But the other boat, having put off from the ship about an hour before this, gave me some uneasiness for their safety; for the weather was very tempestuous. At 6 A. M. the King

George broke adrift, and drove to the WSW. under bare poles, it blowing too hard to set canvas. But, blowing as it did, had our people been on board, and the ship clear, I would have cast off and gone along with him, for the wind was along the floe, and a heavy surge set in on the edge of it, so that our situation was not one of the safest. We soon, however, had smooth water, in consequence of the ice setting toward us, and in a short time were beset. At 1 P. M. the gale rather abated, and the weather was more clear. We now got sight of our absent people upon the floe to leeward, who were almost exhausted with hunger and cold. One of them, indeed, had entirely lost the use of every faculty, both of body and mind, but he happily recovered, and all the rest got well again. In the afternoon the weather was more clear, and I saw the King George about ten miles to the SW. apparently beset as we were. There appeared to be a great body of ice within us and the land. It was evident we had drifted a great way to the southward, for, by the appearance of the land, we were fifteen or eighteen miles from the place where the fish was struck. This space appeared to be entirely covered with a compact mass of ice. There was much water in sight, however, to the SSE., which had a good effect in keeping up the spirits of the people. We lay fast beset all night, which was dark and gloomy.

Wednesday, Sept. 4.—In the morning we had moderate ENE. winds and sleet. In the afternoon, being fine clear weather, I sent two boats and crews away in search of the boat and lines that were to leeward of the floe. At 4 P. M. the ice slacked, and enabled us to get under-way, and to get out into sailing ice. The King George was likewise under-way at the same time, standing to the SE., and appa-

rently had plenty of room, for I did not see her tack the whole afternoon, until I lost sight of her in the dark. At 8 P. M. the boats returned on board, but without finding the whale-lines. We dodged all night, in order to search for the lines or fish in the morning; but a change of weather occurring, made an alteration in our plans.

Thursday, 5th Sept.—Strong ENE. winds, and thick weather. At 5 A. M. proceeded to the southward amongst floes and loose ice. At 8 A. M. fell in with a compact mass of floes, and was obliged to ply to the eastward. At 7 P. M. got sight of a very large floe, and apparently a sea of water to the SE. It was now blowing very strong, but more clear. I carried as much sail as possible, in order to get made fast to the floe before dark; where we were well secured by 10 P. M. Very thankful I was for my apparently good situation; for the weather had every appearance of an increasing storm through the night. At 11 P. M. the gale was tempestuous, accompanied with snow. It indeed blew a mere hurricane through the night. It was so dark, that we were not able to see from one end of the ship to the other.

Friday, 6th Sept.—At 8 A. M. it was more clear, and the gale a little abated; but the wind shifting to the NE., we were soon annoyed with drift-ice setting along the edge of the floe. We therefore shifted into a bight in the floe, that was hard by, and made her well fast for another night's lodgings. Moderate winds and clear towards night. The land in sight forty or fifty miles distant. The ice, where we came out, which only the other night was very open, was now a compact and impenetrable pack. The ice to the eastward had also set in greatly towards us; but yet we had a large hole of water. Light NE. winds and fine weather all night.

Saturday, 7th Sept. commenced with light ENE. winds and fine clear weather, and a moderate frost. At 3 A. M. cast off and proceeded to the eastward, along the edge of the floe about three miles, and then came to a compact barrier of floes. This chain having a lane of water to leeward, with the packed ice on the west side, we proceeded along it, with but little interruption, to the southward, until we were without all the floes, with loose ice, to the eastward. At 10 A. M. strong winds and hazy weather. Finding the ice slack, proceeded to the SE. as fast as possible. At noon strong gales at ENE., but more clear, and plenty of water to the southward, with a pack to the westward. At 4 P. M., after steering about thirty miles SE. amongst sailing ice, we got into an open sea, where there was much swell. We stood all night to the SSE., and had dark gloomy weather.

Sunday, 8th Sept.—Strong ENE. gales, and thick weather. At 6 A. M. fell in with streams of very heavy ice, and apparently much ice to the southward. I therefore wore and stood to the westward, for I then reckoned the ship to be in latitude 71° 30′, about the parallel of Jan Mayen. To make sure of going to the westward of the island, we stood in all the day, and dodged all night, having dark stormy weather.

Monday, 9th Sept.—At 5 A. M. more moderate, but hazy weather. Made sail and proceeded to the SE.; but soon came to a solid pack of ice, along which we steered to the WSW. At 8 A. M. it cleared up, and we saw the land only thirty or forty miles distant, which I did not expect to be in sight of; but our having been continually in a heavy SE. sea, from the time of getting out of the pack, may perhaps account for our getting so much westing. Within this heavy pack was a large lane of water, entirely free from

ice, stretching along the land to the SW.; and also clear water to the NE. At noon had a good observation in 70° 40′ N. I was convinced, from the situation of the ice, that plying round the NE. of the pack to the eastward, was the most safe and certain way of getting out. Accordingly, we beat to windward until dark, and dodged all night under a point of ice in smooth water. Strong winds from 2 P. M., and a strong gale all night, with some snow.

Tuesday, 10th September.—At 3 A. M. more moderate and clear. Made all sail, and plyed to the eastward. At noon had a good observation in 70° 26′ N. The land was in sight at NW., fifty or sixty miles distant. At this time weathered the pack, and steered to the SSE. in an open sea. At 2 P. M. strong winds and hazy. At 4 P. M. fell in with heavy loose ice, after sailing twenty-five or thirty miles from the pack. As the night was fast approaching, and the weather stormy, I wore, and stood into clear water, where we close reefed our topsails, in order to dodge all night, which was very dark.

Wednesday, 11th Sept.—Strong gales at ENE., and hazy weather. At 4 A. M. proceeded to the SSE. amongst heavy loose ice. At 7 got out into clear water, and were no more troubled with ice. We carried strong ENE. gales and thick weather until next morning, when we had a change of wind to the WNW; observation 68° 15′ N.

We had, for the most part, moderate winds from SSW. to W. the remainder of our voyage, and arrived at Aberdeen 24th September, with two fish, that produced 33 tons of oil.

Note.—The last time I saw the King George was on the 4th September, when she was proceeding to the SE. with all sail set. It is evident, if he continued making the

best of his way out of the ice, that he would be about the outside of the pack, if not amongst the sea streams, on Thursday the 5th, at night, or on Friday morning, which commenced with a most heavy ENE. gale, and snow. As this ship has not yet been heard of, it is probable that she was entirely lost amongst the heavy streams that were drifted in various directions from the pack. Such, at least, I imagine, has been the fate of that unfortunate ship and crew; though some are of opinion that she has been beset among the land-ice, and there either lost or imprisoned for the winter.

Memorandum respecting the King George, and the Sufferings of some of her Crew in the Whale-fishery.

The King George, Captain Proven, sailed from London to the Greenland whale-fishery in the spring of 1822. A peculiar fatality seemed to attend her in the outset. Mr Gibson, surgeon of the Trafalgar, gave me the following particulars respecting the sufferings of part of her crew, who were a long time absent from the ship in a severe frost, soon after she entered the fishing stations. The crew of the King George, it appears, struck a fish during one of those severe gales which we had in the month of May, when the thermometer fell to zero or below. Thick weather setting in, they lost sight of the ship, and were exposed to the severities of the most intense cold and violent storm, for fifty hours. One man fell a victim to the cold while on the ice, and another died soon after he reached his ship. All of them suffered from the severity of the exposure, more or less. Some lost their fingers,—others their toes,—some their hands,—and others their feet. The surgeon

of the King George told Mr Gibson, who supplied him with some dressings, that he had amputated thirty-five fingers and toes in one day! An example was given of the severity of the cold, by one of the King George's sailors, who stated, that a quantity of beef that was sent in the boats to the men upon the ice, when they first saw them, was taken hot out of the coppers; but before they reached the ice, though at no great distance, it was frozen so hard that they had to cut it in pieces with hatchets.

No. VI.

JOURNAL of PROCEEDINGS on Board of the Trafalgar of Hull, Captain LLOYD, on the East Coast of West Greenland, from the 12th to the 31st of August 1822.

THE Trafalgar of Hull was long in company with the Baffin, on the voyage narrated in this volume, and was at last separated from us by getting beset on the 12th of August. Her situation at the time was supposed to be one of great danger; but it proved to have been still more extreme than we expected. Having, as this Appendix was printing, unexpectedly met with a journal kept by Mr John Erskine Gibson, who was surgeon of the Trafalgar, I considered a part of it so interesting, as to form a desirable article for my Appendix. The following particulars, relating, 1*st*, to the dangerous state of the Trafalgar while beset; 2*d*, to her equally dangerous situation in the gale of the 23d of August; and, 3*d*, to the adventures of five of her men, who were left all night in the midst of this storm upon a piece of ice,—are extracted in substance, and in some places verbatim, from Mr Gibson's journal. The first section shews, that the narrow escape we made from an entanglement similar to that of the Trafalgar's, was fully as remarkable and important as I then considered it to be *; the second shews the great danger of the storms which occur, at the close of the fishing season, on the east coast of Greenland, particularly to ships about leaving the

* See pages 261. and 268. of this volume.

ice; and the last gives an example of one of the most extraordinary deliverances from premature death, which the records of the whale-fishery perhaps can furnish.

Monday, Aug. 12.—At 4 P. M., blowing a fresh gale with rain, the floe to which the ships were made fast set down towards the lee ice, so as to render our situation perilous. The Baffin and Fame having cast off, we followed their example. Some of our boats that had been sent to look out for fish in the inlets on each side of Traill Island, had by this time returned on board, and at 7 P. M. the last reached the ship. Towards midnight we became unexpectedly entangled among heavy rank ice and floes, so that we had to call all hands to take care of the ship. Soon afterwards, while endeavouring to pass through betwixt a large floe, and some loose ice that was setting down upon it, the ship received some severe blows on the bows. Finding it then impossible to get out, we lay to, and in half an hour the ship was close beset. The Baffin and Fame got out just as the ice closed, and, in the mist, we soon lost sight of them. Though this discouraged us, we were quite confident that they would hover about until we got free again, or pick us up, in the event of the ship going down.

Tuesday, 13th.—Though I retired to bed when the ship was fast enclosed, I endeavoured in vain to sleep, as I every minute expected to be called to quit the ship. About 3 A. M. a large piece of ice pressing on the outside of the ship, opposite to my bed-cabin, broke two or three of the timbers, with a dismal noise. Thinking all was over, I sprung out of bed. The first person I saw was the mate, who was employed filling a canvas-bag with flannel shirts, stockings, &c. out of his chest. Being greatly alarmed, I hurried on my clothes, and then followed his example, in se-

curing some of the warmest of my Greenland apparel. On going upon deck, to my great consternation, I found the ship under an enormous pressure, from numerous huge masses of ice surrounding her on all sides, without an opening of water sufficient for a boat within two miles; and what greatly augmented my concern was, that no ship was in sight, though the weather was now tolerably clear. Most of the crew were now engaged in providing for shipwreck, by filling their bags (which they carry for this purpose) with clothes, and some of them tying up their hammocks, to be ready for another ship. Many of the people, conscious of their great danger, were employed in supplications to Divine Mercy for deliverance; and I likewise sought refuge from the painful apprehensions of threatening death, in a similar occupation. At 8 A. M. sounded in 142 fathoms. At 9 A. M. the captain gave up all hopes of saving the ship; and faint were mine of saving ourselves. With the confident expectation of shipwreck, we made such preparations for this calamity as circumstances would admit. Four days allowance of provisions were cooked with all speed; other provisions were taken upon deck; and every thing of importance placed in readiness for being thrown upon the ice. At 11 A. M., however, our drooping spirits were greatly revived, by observing a slight relaxation of pressure; but in half an hour we were again thrown into despair by the return of the pressure. At noon, a man at the masthead saw a ship (the Baffin), on which we instantly made signals of distress. At this time a dead silence prevailed throughout the ship; the crew looking on one another in awful suspense. At 1 P. M. the pressure was so strong, that the pannels of the captain's state-room door were forced out of the framing. About half an hour after this, the ship was suddenly thrown upon her larboard side, on which all

hands, each carrying his bag of clothing, sprung upon deck. I shall never forget the confusion of the poor men, nor their wild looks, when they gained the deck, for the half of them happened to be below at the time of the shock, and, from the smallness of the hatch, could only get up one at a time. "Some leaped upon the ship's side, and were going upon the ice, when the captain cried out to them to behave like men, and stick by the ship, so long as she remained above water." We all stood on that part of the ship nearest to the ice, with our bags on our shoulders. I kept close by the captain, in a state of mind easier to be conceived than related. For fifteen minutes we had patiently awaited our doom, when, by the interposition of Divine Providence, the wind changed, the ice began to set off from the ship, and in fifteen minutes more she recovered an upright position. The water now rapidly spread among the surrounding ice, and we threw our bags below, and prepared for warping. Some of the hands were then sent below to recruit their strength with a little rest. At 6 P. M. called all hands to warp the ship into a place, about twenty yards a-head, of less danger, in which we succeeded, after considerable labour. At 8 left off warping. About midnight the captain and myself went below and rested on the cabin-floor, with our knapsacks as pillows, and a sail as our bed-clothes.

Wednesday, 14*th*.—At 4 A. M., called all hands to warp the ship clear of a great body of ice, that threatened immediate destruction. In this, contrary to general expectation, we succeeded. At 7 some of the hands were sent below, and at 9 they were called up to renew their labours. On this summons, the men who were asleep mistaking it for a call to quit the ship, came bouncing upon deck with their bags in their hands, in great alarm. This curious

scene, notwithstanding our uncomfortable situation, occasioned considerable amusement. At mid-day it was dark and foggy, but mild and calm. At 5 P. M. all hands were again called to track the ship along the side of some floes. The ice became more open as we advanced, and at 7 P. M. we were so free, that a boat was sent a-head to tow the ship, the weather being quite calm. Soon afterwards, a breeze springing up, we made sail, and appeared to be out of danger.

Thursday, 15th.—"At 2 A. M. I was awoke by the mate, who desired me to rise, and he would shew me a pleasant sight. I accordingly rose, and he shewed me his clothes, taken from the bag, and neatly packed in his chest." He also gratified me with the information, "that the ship made no water, and as yet they could observe no material damage." At 5 A. M. we considered ourselves quite safe. The weather clearing up, we saw a ship standing to the SE., which we afterwards joined. It proved to be the North Britain of Hull. "When I went upon deck, it was like visiting one's friends on the morning of a new-year's day. Every one came to congratulate me on our narrow escape, with countenances very different from those they had a little before wore. The happiest of them, I need hardly observe, was not happier than I. At 8 A. M. saw a fish, which we pursued, unsuccessfully. At noon observed in Lat. 71° 52′ N."

* * * * *

Thursday, 22d of August.—Moderate weather in the morning. Stood to the eastward, until the ship got among immense fields and other large masses of heavy ice. At 4 P. M. the weather was clear; but at 5 it became so thick that we could not see eight yards from the ship. In the evening blowing fresh with heavy rain. Latitude observed at noon 72° 50′ N.

Friday, 23d.—At 2 A. M., plying to windward in company with the Elizabeth, it began to blow hard with sleet. At 4 A. M., blowing still harder, we called all hands to take care of the ship. But the sea now beginning to run high, and the thickness of the weather preventing us from keeping clear of the ice, the ship received some heavy blows on both sides. At 8 A. M. it blew a tremendous gale, and the sea was higher than any one on board had ever seen it among the ice. "We made several attempts to bring the ship alongside of a floe, and make her fast; but the floes being all to leeward of us, we were driven against them with great violence, and received considerable damage. Thus situated, we stood out from among the floes, and plyed to windward among the loose ice." "By the force of the waves, the ice was now driven against the ship with such violence as alarmed the boldest of the crew. At 1 P. M., received a dreadful blow upon the starboard bow, which we thought had stove the ship. I was not singular, at this instant, in my dismal apprehensions of a watery grave; as the heavy sea would have swamped any boat that we might have endeavoured to save ourselves by." At 2 P. M., carried away the mizen-topmast, and half an hour afterwards one of the boats was washed away, but hauled on board again by the line, which was fortunately fastened to the rigging. At 3, we passed under the stern of the Elizabeth, that had contrived to make fast to a floe. "At first we were greatly enlivened by the sight of this ship, but our thoughts took a different turn when we perceived that her whole starboard broadside was stove, and the ship, to all appearance, almost full of water." She made signals of great distress, but we could not afford her any assistance. "At 4 P. M., while tacking, our ship was driven against the corner of a floe, and her starboard-bow completely stove." On attempting to get her off, she struck a

large mass of ice, which laid her almost upon her beam-ends alongside of the floe. For a quarter of an hour she was unmanageable. The blows she received were prodigious. Cries of "water in hold," and "the ship's sinking," now called forth ejaculations bearing the form of prayers, from the most hardened,—and "excited thoughts which are not to be conceived but by one who has been in a similar situation." The ship, however, did not fill, and we succeeded in getting clear of the floe; but were once more at the mercy of the ice and waves. Both pumps were now required to keep the hold free of water. From this time, for three or four hours, we were plying to windward, under a brisk sail; but encountering great and continued difficulties from the sea and ice, and the severity of the weather. At 9 P. M. we made another attempt to moor the ship to a floe. Five active men were sent to fix some anchors, and two warps were fastened to them. Two of the men in the boat returned for another anchor, and just as they got hold of the ship, both the warps broke that were fast to the ice; and the ship turning quickly round, received a dreadful shock on her quarter against the floe. This compelled us to stand out amongst the loose ice again; about an hour afterwards we returned, and sent a boat to endeavour to bring on board those unfortunately left upon the ice. But the sea was so heavy that the men refused to risk themselves in the boat, and it returned without them. We now were obliged to reach off to the eastward, among the loose ice, to the distance of nearly twenty miles from the poor men on the floe. Here we had room to beat to windward. At midnight the wind veered to the eastward, and began to abate.

Saturday, 24th.—Towards morning the weather cleared up, and the wind abated, on which we commenced a care-

ful search for the five absent men, though with very small hopes of ever seeing them again. But, after standing four hours to the westward, to our great joy, we got sight of them with the glass from the mast-head, upon a small piece of ice, and at 8½ A. M., sent a boat and took all of them on board alive; and, considering the severities they had endured, from cold, wet, and hunger, in better health than could possibly have been expected. The same hardships must have killed any one not accustomed to these regions. It was indeed a deliverance of the most extraordinary description. The account they gave of their perilous adventures, was to the following effect:

Shortly after the departure of the boat which had attempted their rescue, a portion of the floe upon which they stood broke off by the action of the swell, and before they could step across to the main sheet, the water intervened and prevented their retreat. They soon drifted from beneath the shelter of the floe into a heavy sea. Almost every other wave now washed over the piece of ice, so that to secure themselves, they were obliged to lie down flat on their bellies, and cling to the edge of the ice with their hands. In this state of dreadful suffering and danger, they remained until about midnight, when the mass of ice to which they clung was dashed by the waves against another lump, and broke into three pieces. They were fortunately on the largest part (which, however, was only a few yards in diameter), and on this they spent a dismal and hopeless night, frequently washed over by the sea, and in perpetual expectation that the next heavy wave would force them from their imperfect hold, and bury them in the deep. As soon as the sea began to fall, they contrived to stand upright, and to move about, so as to gain a little warmth. But this measure was likely to fail, when, on

the clearing away of the mist, they were overwhelmed in despair, on finding there was no ship within sight. The Trafalgar, they now apprehended, had foundered in the gale, and if so, their situation was indeed without hope. The usual effect of severe exposure, in occasioning drowsiness, then began to make its appearance amongst them, and one man expressed great desire to sleep, which, however, his companions very prudently prevented; otherwise, it is probable, he would have awoke no more. Soon afterwards they were rejoiced by a sight of the ship, whose approach gave some stimulus to their spirits, and enabled them to make that exertion which was necessary for preserving life, until they could be taken from their perilous situation.

At 10 A. M., saw the Kiero of Hull, made fast to a floe, which ship we joined for the benefit of the assistance of her carpenters to endeavour to repair our damages. At noon the weather fell calm, and the sea, which a short time before had been so turbulent, was now as smooth as a mirror. The Captain of the Kiero gave us every assistance in his power. The Trafalgar was hove down; but the principal leak proving to be near the keel, was unfortunately inaccessible. Both pumps at work all the day.

While these operations were going on, the Kiero, which had safely rode out the gale fast to the floe, sent two boats to the assistance of the Elizabeth, that was seen at a considerable distance, and appeared to be in a very bad state. Her mizen-mast was gone, several of her yards were broken, and three of her boats washed away.

As soon as these ships were sufficiently refitted, to enable them to undertake the passage home, they proceeded to the eastward in company, and got clear of the ice on the 31st of August.

No. VII.

TABLE OF LATITUDES AND LONGITUDES of Headlands, Bays, and Islands, on the Eastern Coast of Greenland.

[The Latitudes or Longitudes marked thus *, are somewhat doubtful, being derived from the position of the ship when at too great a distance; and those marked ‡, are still more doubtful, owing to the want of sufficient bearings and observations respecting them. Those without any particular mark, are considered as sufficiently accurate for all purposes of navigation.]

	Latitude.	Longitude.
Allan, Cape	71° 48′ N.	21° 53′ W.
Arundel, Cape	73 57	21 0 *
Barclay, Cape	69 13 ‡	24 25 ‡
Beaufoy, Cape	74 42 *	20 0 *
Bennet Island,	73 29	21 37 *
Biot, Cape	71 53 ‡	23 20 ‡
Bontekoe Island,	73 29	20 40
Brewster, Cape	70 11	22 0
Bright, Cape	74 52 *	19 22 *
Brinkley, Cape	74 6 *	21 15 *
Brisbane, Cape	74 16 *	20 30 *
Brown, Cape	71 48 *	22 54 ‡
Buache, Cape	71 48 ‡	23 38 ‡
Buch, Cape	71 28 *	22 20 *

	Latitude.	Longitude.
Buddicom, Cape - -	71° 1′ N.	21° 31′ W.
Campbell Bay - -	71 18	21 30
Canning Island (middle),	71 43 *	22 10 *
Carnegie, Cape - -	71 45 ‡	23 35 ‡
Clark, Cape - -	74 32 *	19 51 *
Constable, Point - -	70 57 ‡	22 36 ‡
Craig Islands, - -	72 22 ‡	22 20 ‡
Crawford, Cape - -	71 40	21 57
Church Mount, - -	71 4	21 37
Dalton, Cape - -	69 26 *	23 37 *
Davy's Sound, (middle of the entrance), - -	71 58	22 0
Double Mount, - -	71 0	21 39
Ewart, Cape - -	69 22 *	23 50 *
Fame Islands, - -	70 58 ‡	22 30 ‡
Fleming Inlet, (middle of the entrance), - -	71 50 ‡	23 10 ‡
Fletcher, Cape - -	71 36	22 4
Franklin, Cape - -	73 20	21 53 *
Freycinet, Cape - -	72 45	22 8 *
Gale Hamke's Bay (middle of the entrance), - -	74 57 *	19 10 *
Gibson, Point - -	70 34 *	22 22
Giesecké, Cape - -	73 26 *	21 50 *
Gladstone, Cape - -	71 33	21 38
Glasgow Island, - -	70 48	21 31
Graham, Cape - -	69 47	22 43 *
Greg, Cape - -	70 57	21 31
Greville, Cape - -	71 23 ‡	22 10 *
Henry Island, - -	69 33	23 12 *
Herschel, Cape - -	74 20	19 58 *
Hewitt, Cape - -	71 27	21 30

	Latitude.	Longitude.
Heywood Island,	70° 43′ N.	21° 31′ W.
Hodgson, Cape	70 32	21 23
Hold-with-hope,	73 30	21 16 *
Holland, Cape	73 43	21 5
Holloway Bay,	70 55	21 36
Home Foreland (middle)	73 51	21 0
Hooker, Cape	70 24	22 57
Hope, Cape	70 29	22 19
Humboldt, Cape	73 16	21 57 *
Jackson Island,	73 56	20 8 *
Jones, Cape	71 4	21 33
Kater Bay (middle of entrance),	74 48 *	20 0 *
Krusenstern, Cape	71 32 *	22 12 *
Laplace, Cape	72 59	22 17 *
Leitch, Cape	72 57	22 14 *
Leslie, Cape	72 30 ‡	24 50 ‡
Lister, Cape	70 30	21 30
Mackenzie Inlet (middle of the entrance,	73 28 *	21 43 *
Macknight, Cape	71 14 ‡	22 20 ‡
Masclet Bay,	71 2	21 33
Manby Island (middle),	69 43	22 42
Mewburn, Cape	72 12	21 54
Moorsom, Cape	72 11	21 51
Mountnorris Inlet (middle of the entrance),	72 22	21 50
Murray Island,	71 33	21 31
Neild Bay,	71 23	21 30
Neill's Cliffs,	70 30	22 37
Parker Island,	70 43	21 20
Parry, Cape	72 27 *	21 45 *

	Latitude.	Longitude.
Phillips, Point - -	70° 35′ * N.	22° 40′ W.
Pictet, Cape - -	72 7	23 15 ‡‡
Pillans, Cape - -	69 53	22 30
Pinnacle Mount, - -	71 13	21 37
Raffles Island, - -	70 37	21 27
Rathbone Island (E. end),	70 40	21 15
Reynolds Island, - -	71 31	21 30
Roscoe Mountains (middle),	70 36	21 40
Ross, Cape . -	70 48 ‡‡	24 0 ‡‡
Rossel, Cape - -	73 6	22 17 *
Rossilly, Cape - -	71 50 ‡‡	23 30 ‡‡
Russell, Cape - -	70 2	22 23
Sandbach Island, - -	70 44	21 32
Scoresby's Sound (middle of the entrance), - -	70 19	21 58
Scott's Inlet (middle of the entrance), - -	74 3	21 0
Seaforth, Cape - -	71 46 ‡‡	24 0 ‡‡
Simpson, Cape - -	72 7	22 6
Smith, Cape - -	71 14	21 30
Smith's Island, - -	71 49	22 17
Stevenson, Cape - -	70 22 *	24 23 *
Stewart, Cape - -	70 28	22 36
Steward Island, - -	69 47	22 30
Swainson, Cape - -	70 28	21 37
Tattershall, Cape - -	71 8	21 33
Tobin, Cape - -	70 26	21 55
Topham, Cape - -	71 20	21 27
Traill Island (middle), -	72 12	22 20
Turner Island, - -	70 38	22 53
Vandyke Cliffs, - -	72 10	21 57
Wallace Bay, - -	70 4	22 23

	Latitude.	Longitude.
Wardlaw, Cape	71° 47′ N.	22° 0′ W.
Werner Mountains,	72 5 ‡	24 10 ‡
Wollaston Foreland (middle),	74 25	19 50
Wood, Cape	71 18 ‡	22 27 *
Young's Bay,	74 21 *	20 35 *
Young, Cape	72 16	21 52

No. VIII.

REMARKS on the STRUCTURE of GREENLAND, in support of the opinion of its being an assemblage of Islands, and not a Continent. By Sir CHARLES GIESECKE' *.

IT is past doubt, that the whole coast of Greenland formerly consisted of large islands, which are now, as it were, glued together by immense masses of ice.

Such inlets, or rather firths *(fiords)*, which once formed sounds or passages, terminate always, according to my observations, with glaciers filling up the valleys at each end. Such is (to confine myself to the more northern latitudes), the ice-firth, or ice-bay, of Disco Bay, in 68° 40′. Such, also, is Cornelius Bay (North-east Bay, or Omenak's Fiord), 71½°, the north-eastern arm of which is blocked up at both ends with ice running through a valley, and bending rather towards the ENE.

It is only by this arm of the bay that we can suppose an ancient communication with the eastern coast, as its

* This important article was received from Sir Charles Giesecké, in a letter to the author, dated 13th of February 1823. It ought to have been embodied in Chapter XII. at page 329., but did not arrive in time. By the same communication, Sir Charles very politely granted me the use of his interesting original chart in MS. of the east side of Baffin's Bay and Davis Straits, a part of which being of great consequence for the illustration of the opinion respecting the structure of this country given in Chapter XII., is included in the Comparative Map, Plate VIII.

south-eastern arm is surrounded by high mountains. The natives have no tradition with respect to this bay. There is another bay, which I could not investigate to its bottom, on account of the immense masses of ice that were setting out, and which is called by the natives Ikek and Ikaresak (*sound*). It runs between Karsarsuk and Kingitok, and its length is from Karsarsuk to its end about fifteen German miles: it is situated in 72° 48′, and the sea, at its entrance, is covered by numerous islands. All the natives living in this neighbourhood, assured me unanimously, that there had been a passage formerly to the other side of the land. They told me also, that they were afraid, that, with heavy north-easterly gales, the ice would go off again, and that the people from the other side, whom they describe as barbarians, would come over and kill them. They stated, that, from time to time, carcasses of whales, which had been killed on the other side, pieces of wood, and fragments of utensils, were to be seen driving out of this bay. The currents set out of it in the same manner as in Icy Bay*.

The most northern bay which I had the good fortune to examine, stretches towards the north-west, and is bounded on the north-east and south-east (two different arms) by immense glaciers. It is situated in 75° 10′, and the land around it is rather low. The depth of the sea near the glaciers in Icy Bay exceeds 300 fathoms, which may be easily ascertained by calculating the height of the floating ice-mountains above the surface of the sea. In Cornelius Bay, I measured the depth with a whale-line, and found it 150 fathoms.

* The *outset* from these bays, and the inset on the western side of the country, are almost demonstrative of the complete perforation of Greenland by inlets or firths, and of its insular structure.—(See page 329).

No. IX.

Explanation of some of the TECHNICAL TERMS made use of in the foregoing Journal.

Bay-ice.—Ice newly formed upon the sea.

Bearing.—The direction of an object in reference to the points of the compass, or the true meridian. In the former case it is the magnetic bearing, in the latter the true bearing.—See *Trend.*

Beset.—The state of a ship when so closely encompassed by ice, as to render her incapable of moving.

Bight.—A bay in the outline of the ice.

Blink.—A stratum of lucid whiteness which usually appears in the lower part of the atmosphere, over ice and land covered with snow. The latter, called *land-blink*, is commonly of a yellowish colour. The former, called *ice-blink*, bright white.

Bore, or *Boring.*—The operation of forcing a passage through loose ice, under a pressure of sail, is termed "boring."

Brash-ice.—Small nodules and fragments of ice, broken off by the attrition of one piece against another.

Calf.—A portion of ice beneath a large mass, but not frozen to it, which shews itself on one side, and is apt to be disengaged by a slight motion.

Clear-water.—Either an opening among the ice, or an entire sea quite unincumbered with ice.

Cross-ice.—Loose ice, affording a dubious and difficult passage to a ship.

Crow's Nest.—A circular box, like a small pulpit, fixed at the mast-head, for the accommodation of the captain or officer, when employed in navigating the ship through ice, or looking out for whales. This structure, which is extremely commodious, was the invention of Captain Scoresby *senior*, and is now universally used by the northern whalers.

Drift-ice.—Masses of floating ice, of the sheet kind, of various shapes and magnitudes, up to, perhaps, a quarter of a mile in diameter.

Field.—A sheet of ice so extensive, that its limits cannot be discerned from a ship's mast-head.

Floe.—A large sheet of ice, whose extent can be seen from a ship's mast-head. This term is seldom applied to pieces of ice of less diameter than a quarter of a mile.

Frost-rime.—A sort of fog that appears on the surface of the sea, in severe frosts, produced by the condensation of the vapour arising from the water, in consequence of its being much warmer than the air.

Heavy ice.—A term applied to thick ponderous ice, in contradistinction to "light," or thin ice.

Hummock.—A protuberance, the effect of pressure, raised upon any plain of ice above the common level.

Iceberg.—The polar glacier. The same term is also applied to large elevated floating masses, sometimes called ice-islands, which are merely dismemberments of the land icebergs.

Ice-blink.—The same as *blink*.

Land-ice.—Grounded ice, or ice attached to the land, whether in floes, or closely aggregated drift-ice, sometimes extending several miles from the shore.

Lane, or *vein.*—A narrow opening, in which a ship may conveniently sail, in a pack or other large collection of ice.

A Lead.—A channel or passage among ice, nearly synonimous with a "lane of water," but it may be more complex. Thus, a lane of water is always a "clear lead," but a lead may also be "cross," or bad, or dangerous.

Light-ice. Thin ice, or ice not generally dangerous to shipping. The different terms bay-ice, light-ice, and heavy-ice, are distinguishable of various thicknesses. Thus *bay-ice* may be said to extend from the first pellicle of ice formed on the water up to a foot in thickness; or, in the case of floes, to a little greater thickness. *Light-ice*, from a foot to a yard, or at most a fathom in thickness; and heavy ice, from about a fathom upwards.

Loose-ice.—Open drift-ice, among which a ship may find a passage.

Open-ice, or *sailing-ice.* Drift-ice or floes, so separated as to afford a convenient passage for ships. It differs little from loose-ice.

Pack.—A body of drift-ice of such magnitude, that its extent is not discernible. A pack is said to be *open*, when the pieces of ice, though very near each other, do not generally touch; or *close*, when the pieces are in complete contact.

Patch.—A collection of drift-ice or bay-ice of a circular or a polygonal form. In point of magnitude, a pack corresponds with a field, and a patch with a floe.

Rank-ice.—Crowded drift-ice.

Sailing-ice.—Open or loose ice.

Sludge.—A stratum of detached ice-crystals, or of snow, or of the smaller fragments of brash-ice, floating on the surface of the sea.

Stream.—An oblong collection of pieces of drift-ice, or bay-ice, the pieces of which are continuous. It is called a

sea-stream, when it is exposed on one side to the ocean, and affords shelter from the sea or waves, to vessels within it.

Tongue.—A point or shelf of ice projecting nearly horizontally from the part of a mass that is under-water. Tongues are firmly attached to the pieces of ice from which they project, and are sometimes so deep under-water, that ships are either grounded upon them, or sail over them.

Trend, or *Trending.*—The direction of a line of coast, or of ice as regards the points of the compass, or the true meridian. Thus, ice or land is said to trend to the southward, when its direction in the part referred to lies nearly north and south. *Trending* differs from bearing, inasmuch as it is generally used to describe the direction of a coast or line of ice in regard to itself; whereas the *bearing* usually refers to the direction of an object, in regard to the place of the observer. Thus the *trending* of a coast betwixt two points of land, A and B may be north and south, or south from A to B, whilst the *bearing* of A from the observer, is perhaps west, and of B perhaps *south-west*. The bearing of land is variable, depending on the situation of the observer: the trending fixed, depending on the situation of the land.

Water-sky.—A dark appearance of the atmosphere, near the horizon, indicating clear water below it.

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